The Refrigeration Service Engineer

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No. 8

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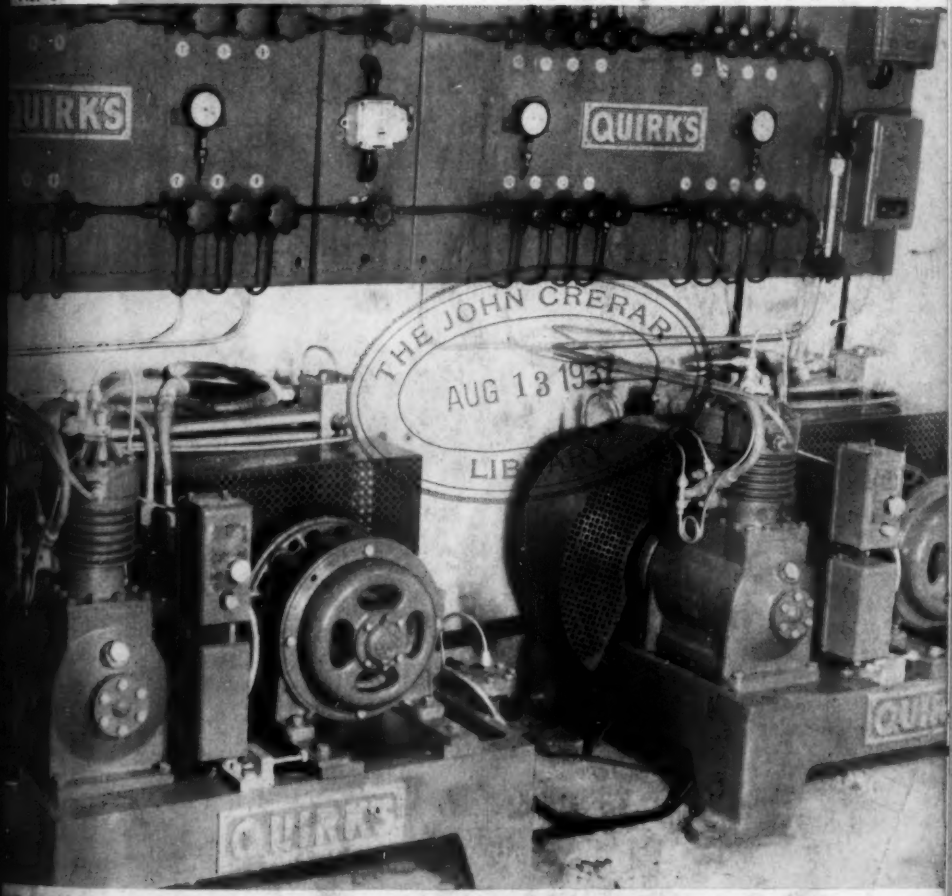

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The Refrigeration Service Engineer

Vol. 5 No. 8

August, 1937

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

Official Organ
REFRIGERATION SERVICE ENGINEERS SOCIETY

COVER

This month's cover shows a refrigeration installation at the "Ship Inn," Circular Quay, Sydney. The two machines refrigerate 12 beer cooling boxes and 7 bottle cabinets, all using direct-expansion evaporators controlled by thermostats and solenoid valves. Motors are 2-hp., and the units may be operated independently or together. Installation by Quirks, Australia.

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The Refrigeration Service Engineer

Vol. 5, No. 8 CHICAGO, AUGUST, 1937 $2.00 Per Annum

Evaporative Condensers

Comparing Evaporative Type Condensers with the Conventional Type

By A. F. HOESEL *

IN artificial refrigeration systems, we are concerned with moving heat from where it is not wanted and then rejecting the heat to some heat absorbing material.

Strictly speaking, a cooling unit is really a heat absorber, and a condenser is really a heat rejector.

The only function of the compressor and refrigerant fluid, used in a refrigerating system, is to pick up the heat from the cooling unit at a low point in the temperature scale, and by means of compression make this heat available at a higher point in the temperature scale, whereby we are enabled to reject this heat directly to the atmosphere or to water, either or both of which may be used to convey the heat away from the condenser, in which the compressed refrigerant vapor becomes condensed to a liquid in which form it again becomes available for useful work.

In Fig. 1 we illustrate, diagrammatically, an air-cooled condenser comprising a finned refrigerant tube circuit over which a fan blows air. We shall assume the following conditions:

Fan blows 1,000 c.f.m.
Entering air 80 degrees F.
Leaving air 100 degrees F.

Under the above stated conditions, the amount of heat rejected, to the atmosphere, becomes:

Heat content (dry air) at 100 degrees F. equals 24.16 B.t.u.'s per lb.
Heat content (dry air) at 80 degrees F. equals 19.32 B.t.u.'s per lb.

Difference equals 4.84 B.t.u.'s per lb.

$\frac{4.84 \times 1000 \text{ c.f.m.}}{13.6 \text{ cu.ft. per lb.}}$ equals 356 B.t.u.'s per minute.

Total Heat Removed

Since the work done, by the compressor, adds approximately 25 percent to the heat absorbed by the refrigerant vapor in the cooling unit, we have $356 \times .8$ equals 284.8 B.t.u.'s per minute heat removal from cooling unit.

While, theoretically, it would be possible to use an air-cooled condenser for any size refrigerating system, irrespective of how large, these air-cooled condenser systems are restricted to the smaller sized units, because generally they are not so economical to operate as the other systems of heat rejection.

In Fig. 2 we illustrate, diagrammatically, a water-cooled condenser comprising a refrigerant tube circuit, inside of which is placed a water tube circuit. We shall assume the following conditions:

* Chief Engineer of Peerless of America

Water flow 3 g.p.m. or 25 lbs. per minute
Water in 72 degrees F.
Water out 90 degrees F.

Under the above stated conditions, the amount of heat rejected, to the water, becomes:

Water out 90 degrees F.
Water in 72 degrees F.

Difference 18 degrees F.

18 degrees F. × 1 (specific heat) × 25 lbs. per min. equals 450 B.t.u.'s per min.

450 B.t.u.'s per minute × .8 equals 360 B.t.u.'s per minute heat removal from cooling unit.

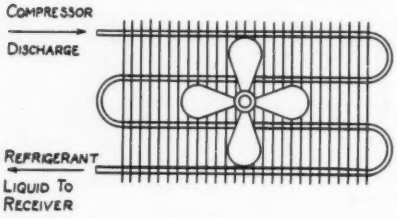


FIG. 1. AIR COOLED CONDENSER.

As mentioned before, it is impractical to use straight air-cooled condensers above comparatively small capacities, yet in many instances we encounter conditions where water is either scarce or rather expensive and, therefore, its use in large quantities becomes prohibitive.

Under the conditions of operation shown in Fig. 2, we find that with 25 lbs. of water per minute at an entering temperature of 72 degrees F. and an exit temperature of 90 degrees F., we are able to remove heat, from

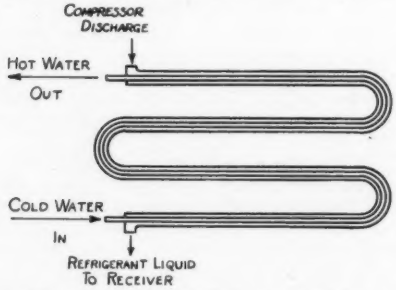


FIG. 2. WATER COOLED CONDENSER.

the condenser, at the rate of 450 B.t.u.'s per minute.

Now, if we had such a system operating in a locality with excessively high water rates, we should naturally be concerned with reducing the amount of water used to a minimum; therefore, if we should regulate the water flow to an exit temperature of 100 degrees F., we should then use only

18 degrees F. × 25 lbs.
——————————— equals
28 degrees F. (T.D. at 100 degrees)
16.07 lbs. water per min.

While reducing the water consumption by approximately one-third, in this instance, it is obvious to those versed in refrigeration that the water flow cannot be throttled below a certain minimum quantity, since every decrease in water flow is accompanied by an increase in condenser pressure, increase in horse power necessary to drive the compressor, and also a decrease in heat absorption capacity of the cooling unit.

Thermal Properties of Water

Investigating the thermal properties of water, we find that the evaporation of water, at atmospheric pressure, involves the transfer of approximately 1000 B.t.u.'s per pound. Therefore, if we have a heat load of 450 B.t.u.'s per minute, we should need, theoretically, $\frac{450}{1000}$ equals .45 lbs. of water per minute, or approximately 1/55 of the water used previously.

It is well known that air has a great affinity for moisture; therefore, with all of the foregoing facts in mind, we shall proceed with an analysis of Fig. 3, which illustrates, diagrammatically, a Peerless Evaporative Condenser comprising a housing in which is placed a condensing coil, an air blower wheel, a blower casing, a water slinger, and a water level float valve.

Operation of Unit

The operation is as follows: The float valve maintains a certain level of water into which the water slinger dips. The rotation, of the water slinger and the air blower wheel, sprays water upon the condensing coil at the same time that air is being blown through the housing. The eliminators serve to prevent free water from being blown out of the saturated air discharge, which is directed to the outside atmosphere.

Since the water slinger sprays the water, inside the housing, its effective surface is greatly increased. Therefore, the air, which is being blown through the water spray, readily picks up moisture and thereby extracts heat from the water, which in turn extracts heat from the condensing coil.

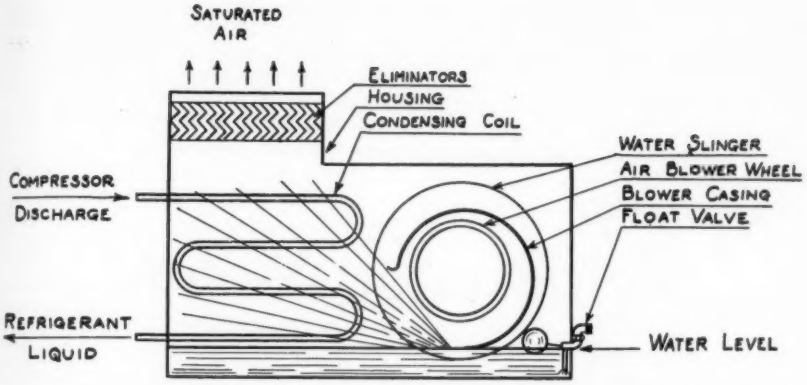


FIG. 3. ILLUSTRATING DIAGRAMMATICALLY A PEERLESS EVAPORATIVE CONDENSER.

Assuming the following conditions of operation, we shall analyze the results:

Air circulation—1000 c.f.m.

Air out—85 degrees F.
wet bulb equals 48.04 B.t.u.'s per lb.

Air in—75 degrees F.
wet bulb equals 37.81 B.t.u.'s per lb.

Difference 10.23 B.t.u.'s per lb. heat gain

1000 C.F.M. × 10.23 B.t.u.'s per lb. equals 14.3 cu.ft. per lb.

715.3 B.t.u.'s per min. heat removal from the condenser.

715.3 × .8 equals 572.2 B.t.u.'s per minute heat removal from the cooling unit.

Fig. 4 shows model PWS1½ Peerless Water Saver (Evaporative Condenser) with the housing cover removed. The operation of this Water Saver is illustrated, diagrammatically, in Fig. 3. Note that the housing cover is readily removable for cleaning the condensing coil and sump, which is necessary at periodical intervals depending upon the condition of the make-up water used to replenish the amount of water evaporated during the operation of the condenser.

From the above, it is seen that an Evaporative Condenser makes a large saving in water used as compared to a system which wastes condensing water directly to a sewer.

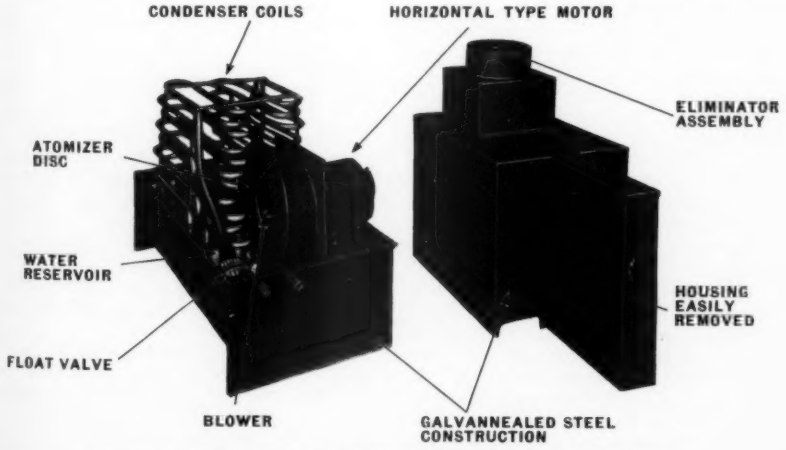


FIG. 4. MODEL PWS 1½ PEERLESS EVAPORATIVE CONDENSER.

Since there are many localities having high water charges, it is evident that the Evaporative Condenser occupies a definite position in the economics of refrigeration.

While heretofore Evaporative Condensers were mostly used on the larger sized refrigeration systems, such as air conditioning systems, they have been in the recent past simplified and decreased in cost to such degree that consideration of their usage now becomes necessary on the part of almost all persons engaged in commercial refrigeration.

Repairing Refrigerator Motors

Many service calls are motor troubles. Heading the list are worn bearings. This article gives some practical instructions on motor repairing.

By GEORGE G. BORDEN

THE most common trouble in refrigeration motors is bad bearings. Since repulsion-induction, capacitor and direct-current motors use the same size and type bearings, it might be well to start this article with a discussion of causes of bearing trouble and how to replace bearings.

Worn bearings are generally caused by the customer's neglect to oil the motor at least twice a year. Occasionally, however, bad bearings are caused by a tight belt. The belt pulls the motor shaft so hard to one side that no space is left between the motor shaft and the bearing surface for a film of oil. Before replacing a motor with a bad bearing, check to see that the belt is not too tight.

A third cause of worn bearings is an oil wick which does not go deep enough into the oil reservoir to pick up oil. All oil reservoirs have overflow holes which keep the oil level from becoming too high in the reservoir. This keeps the oil from flowing along the motor shaft into the inside of the motor. If the wick is short or is not tucked into the reservoir properly, it will not pick up oil and the bearing will run dry.

A fourth cause of worn bearings is a dust-covered motor. Dust will cover the end bell of a motor and enter the overflow hole mentioned above. The dust *will then act like an oil wick and pull all the oil out of the oil well and deposit it on the outside of the motor.* When a customer insists that the motor was well oiled several months before bearing trouble developed, slip your hand around to the shaft end of the motor and see if the front end bell is not covered with oil-soaked dust. The writer was at one time a foreman in a large refrigerator motor repair shop where some 75 motors were repaired every day. Upon checking up on motors which came in because of bad bearings, it was found that 35 per cent of these motors had oil-soaked end covers and dry oil reservoirs.

Testing for Bad Bearings

A bad bearing may show up in a number of different ways:

1. If the machine is properly fused or the switch has the correct size overload protector element, the fuse will blow out or the switch kick out and stop the machine.
2. If the machine is overfused, the customer may complain of a growling or shrill squeaking noise.
3. The customer may complain of a bad odor.

How to Test for a Bad Bearing

When a bad bearing develops it is invariably the one on the pulley end of the motor. This bearing goes bad first for two reasons:

1. It is generally hard to lubricate because of its location in the cabinet.
2. Besides supporting the weight of the armature, it has to support the pull of the belt.

To test for a bad bearing, pull the power supply cord out of its receptacle (don't just turn the switch off as it may be accidentally turned on and you'll get a badly cut hand), slip off the belt, and grab the pulley with both hands. Now try to move the pulley

up and down and from side to side. No play should be discernible. If you can feel a slight movement, replace the motor. (Don't confuse any side play or up and down movement with end play. All motors should have a slight amount of end play. This is tested by moving the shaft in and out the motor end bells.)

How to Replace Bearings

In order to repair all types of motors, a set of bearing punches and an expansion reamer for each motor size must be obtained. The bearing punches shown in Fig. 1 will enable you to service motors up to one h.p. If your shop is equipped with a lathe, you can make these punches out of old automobile axles in a short time. If you haven't a lathe, a local machine shop will make them for you for about $2.00.

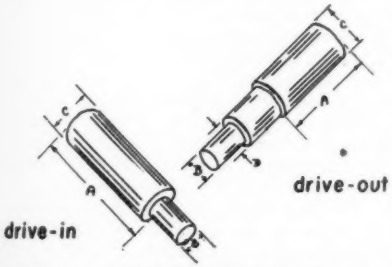


FIG. 1. BEARING PUNCHES FOR REPAIRING MOTORS.

H.P.	A	B	C	D
1/6	3½"	19/32"	2"	21/32"
1/3	3½"	19/32"	2"	21/32"
¼	3½"	21/32"	2"	23/32"
⅓	3½"	21/32"	2"	23/32"

DIMENSIONS OF BEARING PUNCHES USED TO REPAIR DOMESTIC REFRIGERATOR MOTORS.

MOTOR	REAMER
1/6-1/3 H.P.	19/32"-21/32"
¼-⅓ H.P.	21/32"-23/32"
½-¾ H.P.	25/32"-27/32"

TABLE 2. TABLE SHOWING SIZE REAMERS TO BE USED ON DOMESTIC REFRIGERATOR MOTOR BEARINGS.

Table 2 gives the size of the reamers that are required. These may be purchased from your local hardware dealer for about $4.00 each.

A bearing replacement job should be done in the shop for a number of reasons. First, since the motor has to be disassembled in order to replace the bearing, it is little more trouble to completely overhaul the motor. Second, if the bearing is replaced on the job, the customer gets the idea that there is nothing to a bearing replacement job, and the serviceman can not get a fair rate for his work.

To replace a bearing, remove the motor end bell and wash it in kerosene. Examine the end bell to find out whether or not the bearing is held in place by a pin or set screw (Dayfan). If a pin or set screw is used, remove it before proceeding. Set the end bell on a bench, face down. Then set the correct size drive-out punch in the bearing and drive the bearing out of its end bell by beating the punch with a hammer. Take care that the end bell is sitting flat on the bench or else the hammering may crack the cast iron end bell.

When the bearing has been driven out, turn the end bell over on the bench. Now take the new bearing and place it on the end bell with the oil slot in the bearing in line with the oil slot in the end bell. Then take the proper size drive-in punch and by tapping the punch with a hammer, drive in the new bearing.

Now try the bearing on the motor shaft. Invariably it will be too tight. Then take the proper size expansion reamer, clamp it in the vise and carefully ream each side of the bearing until the end cover slides onto the shaft freely but without any excess play.

The motor can now be assembled if no further repairs are to be made upon it. When reassembling a motor, take care that the oil throwers are set over their pins as in Fig. 3 or else the armature will jam and the shaft will not turn.

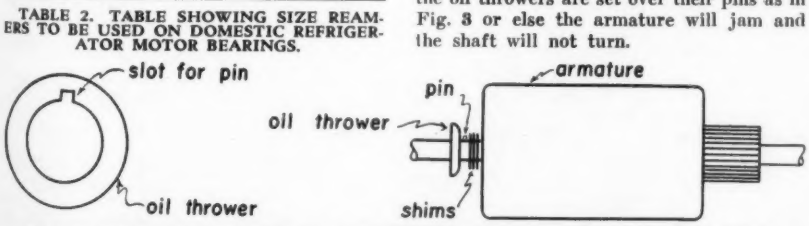


FIG. 3. ILLUSTRATING HOW OIL THROWER IS SLOTTED TO FIT OVER A PIN IN THE ARMATURE SHAFT. IF THROWER ISN'T SET OVER PIN, END BELL OF MOTOR MAY BE CRACKED WHEN MOTOR IS ASSEMBLED.

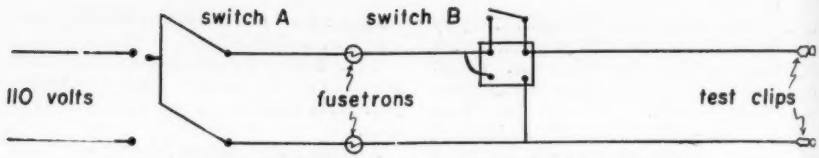


FIG. 4. WIRING DIAGRAM FOR ONE METER MOTOR TEST PANEL.

Before applying power to the field, try to turn the shaft. If the shaft can be turned by using a 3-inch wrench and a moderate amount of force, oil the bearings and apply power to the field windings. Then *when the armature is turning,* beat the motor shaft with a fibre block or a piece of wood. Beat the shaft on all sides and on top and bottom. This beating will line up the bearing inside the end cover. When the bearing is properly installed, the motor shaft should turn over easily by hand. If the shaft won't turn by hand after beating it, remove the motor end bell and ream out the bearing a little more.

The Test Panel

Before going on with the motor repair procedure, it might be well to digress for a few minutes and discuss how to build and use a motor test panel. Although a test panel is not absolutely essential to repair motors, it often saves time by showing up burned-out armatures and open or short-circuited field windings before the serviceman wastes time trying to repair motors that have to be rewound.

In order to test motors up to one h.p., a double range wattmeter or two single range wattmeters should be obtained. These may be obtained from a reputable rebuilt electrical meter dealer for about $15.00 each. One meter should read 0-750 watts; the other should read 0-1500 or 0-2000 watts. For a shop which repairs only domestic motors up to ⅓ h.p. the 0-750 wattmeter will be sufficient.

Fig. 4 shows the wiring diagram for a test panel using one meter and Fig. 5 for a test panel using two meters. Switch *A* is the disconnect switch which is used to start and stop the flow of current through the test panel. Switches *B* and *C* are used to short-circuit the current coil of the wattmeter and thus protect the wattmeter from an overload which might ruin it. When the test panel is in use, *switches B and C should be closed at all times except when you are taking a reading.* As soon as you have read the meter, close switches *B* or *C* so that there will be no possibility of an accidental short circuit ruining the meter. The test panel should be fused up with 5.6 ampere Fusetrons when testing motors up to ¼ h.p. A 6½ amp. Fusetron should be used for ⅓ h.p. motors and a 10 amp. Fusetron for ½ h.p. to 1 h.p. motors. If you are careful to close switches *B* and *C* and to use the proper size Fusetron, there will be little danger of an accidental short-circuit spoiling $30.00 worth of meters.

The proper test procedure to use on different types of motors will be described along with the repair procedure for each type of motor.

Repulsion-Induction Motors

All a.-c. induction motors have short-circuit armatures. In polyphase motors and in split-phase (capacitor, transformer or resistance start motors) the armature takes the form of a squirrel cage, Fig. 6. This form of armature cannot burn out for it is practically solid. Polyphase motors are self-starting in that they need no starting device. Single-phase motors, however, have to employ some starting device. In the split-phase refrigerator motor, the starting device is a centrifugal switch in series with a capacitor and starting winding. In the repulsion-induction motor, it is the brush-holder and brushes. 99 per cent of the trouble encountered on polyphase refrigerator motors

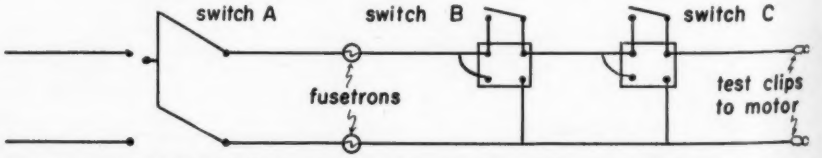


FIG. 5. WIRING DIAGRAM FOR TWO METER MOTOR TEST PANELS. SWITCHES B AND C ARE USED TO PROTECT THE WATTMETERS FROM OVERLOAD.

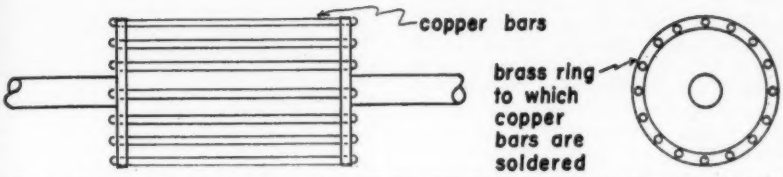


FIG. 6. SQUIRREL CAGE ARMATURE USED ON POLYPHASE AND CAPACITOR MOTORS.

is caused by bad bearings. Trouble seldom shows up in the windings. However, only 75 per cent of the trouble encountered with the single-phase motors is due to bearings; the remaining 25 per cent is due to the starting mechanism.

Fig. 7 shows a cross-section view of a repulsion-induction armature. When the motor is at rest, the motor spring forces the brushes against the commutator. (Note there is no electrical connection between armature and field.) When the power is applied to the field, current flows in the armature by induction (transformer action). The brushes cause this current to flow in definite paths through the armature. As a result of this directed current flow, the armature starts to revolve. (See article six "Electronics for Servicemen" in May issue.) As the armature revolves, the two governor weights start to fly out and start to push the motor rods through the armature. These rods move the necklace collar up to the commutator. At about 900 r.p.m., the weights are straight out and the necklace collar has been moved up so far that the necklace short-circuits the commutator making the armature the electrical equivalent of the squirrel cage armature in the polyphase motor. The necklace collar presses against the brush-holder and pushes it away from the commutator, so that the brushes *do not ride on the commutator once the motor is up to speed.* When the power is cut off from the field, the motor loses speed and the motor spring forces the brush-holder toward the commutator and at the same time forces the necklace collar into the armature and removes the short-circuiting device from the commutator. *The action of each part in a repulsion-induction motor must be thoroughly understood before these motors can be successfully repaired.*

Before disassembling a motor, try to find out why the motor was returned for repairs. Feel for bearing play and end play. If none is discernible, apply power to the motor. If the motor starts, but has low torque and the brushes spark excessively, the brushes are probably too short. When the brushes are too short, they leave the commutator before the motor is up to speed. Hence, the necklace has not moved up to short-circuit the armature, and so the

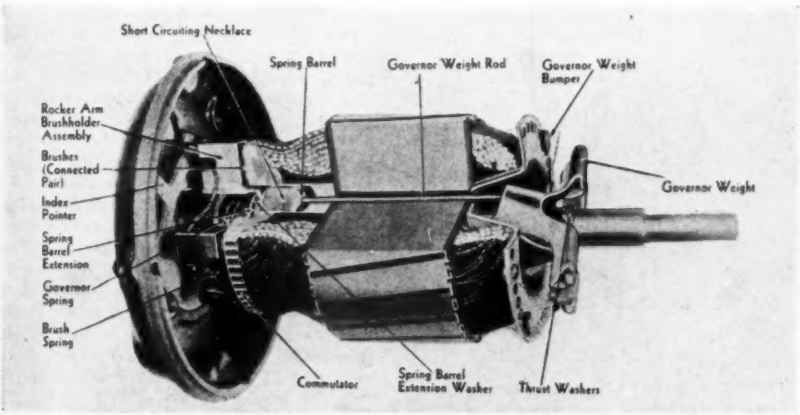


Fig. 7. Typical repulsion start induction running rotor, showing short-circuiting and brush-lifting mechanism.

brushes are still carrying current. Sparking and low torque are caused by the brushes leaving the commutator before the necklace has short-circuited the armature.

When the brushes leave the commutator, the armature can not continue to revolve because there is no current flowing through it. Hence, the speed drops off until the motor spring forces the brushes back to the commutator and the motor will run on the brushes with excessive sparking. If the motor operates in this condition for about an hour, the high current (starting current) passing continually through the windings of the armature will burn out these windings. If the motor is properly fused, the fuse will blow before the motor has run two minutes. A motor with bad brushes will invariably have a rough commutator which will have to be turned down in a lathe.

If the motor comes up to speed and nothing seems to be wrong with it, test the motor for a bad necklace. To do this, apply power to the motor leads and watch for sparking at the base of the brush-holder. Quickly cut the power on and off several times. If the armature sparks at the base of the brush-holder, the necklace is either burned out or very dirty.

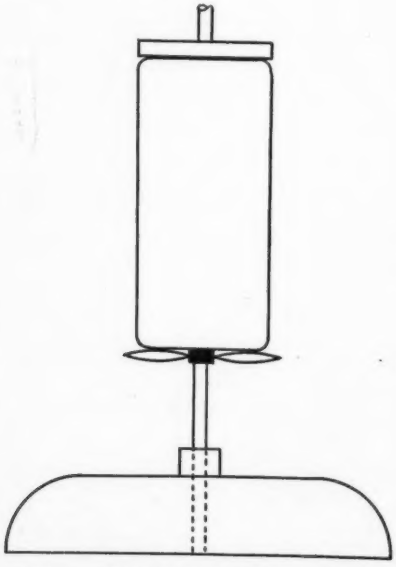


FIG. 8. REMOVE THE ARMATURE FROM THE FIELD AND SET IT ON THE BENCH IN ITS END COVER.

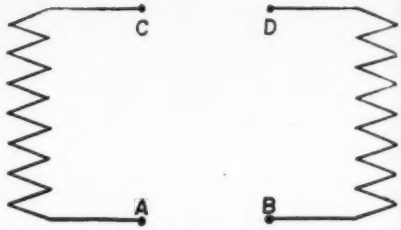


FIG. 9. INTERNAL CONNECTION OF R.I. MOTOR FIELD.

Remove the armature from the field and stand the armature upright in front end cover as shown in Fig. 8 and disassemble the armature. First, remove the oil thrower and the shaft shims. Then remove the motor spring and brush-holder. Take care to place your hand over the motor shaft when removing the motor spring or else it may fly upward and painfully injure you. Remove the armature from the end cover, invert it and bump the shaft smartly on the bench. The necklace, necklace collar, and pins will fall out. The armature is now completely disassembled. (Note on Century motors the pins will not fall out since they are permanently attached to the weights.)

Now before going further, test the armature and the stator (field) to make sure that they don't have to be rewound.

There are two separate windings in the field of a repulsion-induction motor as shown in Fig. 9. When leads *A* and *B*, *C* and *D* are tied together, the two fields are put in parallel for operation on *110-volt circuits*. When leads *B* and *C* are tied together and then taped up, the two fields are put in series for operation on *220-volt circuits*. Since both windings are made with the same size wire and have the same number of turns, they should each draw the same power when they are connected to the 110-volt line.

To test the field windings, hook the field to the test panel as shown in Fig. 10. ***This hook-up connects power to the winding A C only.*** Close the test panel switch *A* and then open short-circuiting switch *B*. Carefully note the power drawn by coil *AC*. Then close switch *B* and open switch *A*. Now remove clip 2 from wire *C* and place it on wire *D*. This connects coil *BD* in series with the test panel. Now close switch *A* and open switch *B*. The meter reading should be within 40 watts of that obtained on coil *AC*. If a wider differential is noted, the field should be rewound.

(Continued on page 37)

Refrigerant and Lubrication Data

for Household Refrigerating Units

Continued from the July Issue

By L. K. Wright, Mem. A.S.R.E.

IN this list of 1932 models there are more than 400 units, of which approximately 78 per cent were charged with sulphur dioxide, 20 per cent with methyl chloride and 2 per cent with isobutane. A list of those models manufactured during the years 1933, 1934, 1935 and 1936 appeared in the June and July issues. In a few instances, data on the exact weight of oil and refrigerants was not secured, and space has been left to insert this data when it is available.

In order to condense the data, the following abbreviations have been used:

SO — Sulphur Dioxide	F21 — F-21
MC — Methyl Chloride	F114 — F-114
Iso — Isobutane	MF — Methyl Formate
F12 — F-12 (Freon)	Car — Carrene
F14 — F-14	EC — Ethyl Chloride

The refrigerant charge given in each case is the correct quantity of refrigerant for proper operation. It is not the pump-down capacity of receiver. Oils are specified by weight or volume. It must be borne in mind that the oil must be chosen which is correct for the refrigerant, sulphur dioxide using the lowest viscosity grade.

Under the heading of the make of machine will be found the various models and their data covering each year.

Information on those machines manufactured during the years of 1933 to 1936 inclusive appear in the June and July issues.

These tables have been arranged to fit a standard size data book, which can be secured from THE REFRIGERATION SERVICE ENGINEER for $1.00. This book will accommodate information published in this form from time to time, as well as providing for other data that the service engineer may accumulate.

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
Apex 1932	**Apex Rotarex Corp. 1070 East 152nd St., Cleveland, Ohio**				
	L-410	SO	1 lb. 8 ozs.	8 ozs.	1/6
	L-500	SO	4 lbs.	11 ozs.	1/6
	L-600	SO	4 lbs. 8 ozs.	11 ozs.	1/6
	L-610	SO	1 lb. 8 ozs.	8 ozs.	1/6
	L-800	SO	5 lbs.	11 ozs.	1/6
	P-600	SO	4 lbs. 8 ozs.	11 ozs.	1/6
	P-800	SO	5 lbs.	11 ozs.	1/6
Bauer 1932	**Bauer Bros. Co. Sheridan Ave. at Burton, Springfield, Ohio (No longer manufactured)**				
	40	MC	1 lb.	¾ pt.	1/6
	50	MC	1 lb.	¾ pt.	1/6
	60	MC	1 lb.	¾ pt.	1/6
	(Brunner compressors used on the above models.)				
Belleville 1932	**Belleville Refrigeration Co. 21 Florida St., Belleville, Ill. (Organization now out of business)**				
	51	SO	7 lbs.	.....	1/6
	L-51	SO	7 lbs.	.....	1/6
	61	SO	7 lbs. 8 ozs.	.....	1/6
	72	SO	7 lbs. 8 ozs.	.....	1/4
	81	SO	8 lbs. 8 ozs.	.....	1/4
	92	SO	8 lbs. 8 ozs.	.....	1/4
Bohn 1932	**Bohn Refrigerator Co. 1350 University Ave., St. Paul, Minn. (Organization now out of business)**				
	BE4-7	SO	1 lb. 14 ozs.	1 pt.	1/6
	BE6-10	SO	1 lb. 14 ozs.	1 pt.	1/6
	BE7-11	SO	1 lb. 14 ozs.	1 pt.	1/6
	BE8-13	SO	1 lb. 14 ozs.	1 pt.	1/6
	BE10-18	SO	1 lb. 14 ozs.	1 pt.	1/4
	BE16-22	SO	1 lb. 14 ozs.	1 pt.	1/4
	(Above refrigeration units were manufactured by Sunbeam.)				
Buckeye 1932	**Domestic Industries, Inc. Mansfield, Ohio (Organization inactive in refrigeration)**				
	44	SO	3 lbs. 6 ozs.	1½ pts.	1/6
	63	SO	3 lbs. 6 ozs.	1½ pts.	1/6
	71	SO	3 lbs. 6 ozs.	1½ pts.	1/6
Cavalier 1932	**Tennessee Furniture Corp. 343 West Place, Chattanooga, Tenn. (No longer manufacture electric refrigerators)**				
	101	SO	1 lb. 14 ozs.	1 pt.	1/6
	111	SO	1 lb. 14 ozs.	1 pt.	1/6
	112	SO	1 lb. 14 ozs.	1 pt.	1/6
	119	SO	1 lb. 14 ozs.	1 pt.	1/6
	121	SO	1 lb. 14 ozs.	1 pt.	1/6
	122	SO	1 lb. 14 ozs.	1 pt.	1/6
	131	SO	1 lb. 14 ozs.	1 pt.	1/6
	132	SO	1 lb. 14 ozs.	1 pt.	1/6
	141	SO	1 lb. 14 ozs.	1 pt.	1/4
	142	SO	1 lb. 14 ozs.	1 pt.	1/4
	152	SO	1 lb. 14 ozs.	1 pt.	1/4
	(Above units used Sunbeam compressors.)				

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
Coldspot 1932	**Sears, Roebuck & Co. Chicago, Illinois**				
	440-C	SO	1 lb. 14 ozs.	1 pt.	1/6
	450-C	SO	1 lb. 14 ozs.	1 pt.	1/6
	460-C	SO	1 lb. 14 ozs.	1 pt.	1/4
	470-C	SO	1 lb. 14 ozs.	1 pt.	1/4
	540-C	SO	1 lb. 14 ozs.	1 pt.	1/6
	440-CP	SO	1 lb. 14 ozs.	1 pt.	1/6
	450-CP	SO	1 lb. 14 ozs.	1 pt.	1/4
	460-CP	SO	1 lb. 14 ozs.	1 pt.	1/4
	470-CP	SO	1 lb. 14 ozs.	1 pt.	1/4
	480-CP	SO	1 lb. 14 ozs.	1 pt.	1/4
	(Refrigeration units manufactured by Sunbeam Electric Mfg. Co.)				
Commerce 1932	**Commerce Pattern Foundry & Machine Co. 2211 Grand River Ave., Detroit, Mich.**				
	4-2-B	SO	2 lbs. 8 ozs.	½ pt.	1/6
	5-2-B	SO	2 lbs. 8 ozs.	½ pt.	1/6
	7-3-B	SO	3 lbs.	½ pt.	1/6
	(Above concern does not manufacture electric refrigerators. Those sold in 1932 were under names of "Artic Aire" and "Commerce.")				
Copeland 1932	**Copeland Refrigeration Corp. 1331 Holden Ave., Detroit, Mich.**				
	A-402	MC	24 ozs.	⅝ pt.	.....
	A-442	MC	24 ozs.	⅝ pt.	.....
	P-442	MC	24 ozs.	⅝ pt.	.....
	D-932-2	MC	.....	1¾ pt.	.....
	E-932-2	MC	.....	1¾ pt.	.....
	E-1152	MC	.....	1¾ pt.	.....
	A-522	Iso	19 ozs.	⅝ pt.	.....
	P-522	Iso	19 ozs.	⅝ pt.	.....
	A-612	Iso	19 ozs.	⅝ pt.	.....
	P-612	Iso	19 ozs.	⅝ pt.	.....
	A-772	Iso	19 ozs.	⅝ pt.	.....
	P-772	Iso	19 ozs.	⅝ pt.	.....
	D-682	Iso	19 ozs.	⅝ pt.	.....
	E-682	Iso	19 ozs.	⅝ pt.	.....
	D-932	Iso	19 ozs.	⅝ pt.	.....
	E-932	Iso	19 ozs.	⅝ pt.	.....
Crosley 1932	**Crosley Radio Corp. Arlington St., Cincinnati, Ohio**				
	C-35	SO	21 ozs.	15 ozs.	1/8
	C-45	SO	28 ozs.	15 ozs.	1/6
	C-55	SO	34 ozs.	15 ozs.	1/6
Dayton (& Niagara) 1932	**(See 1933 list, as same models were turned out for 1932 and 1933)**				
Frigidaire 1932	**Frigidaire Corporation Dayton, Ohio**				
	W-3	SO	3 lbs. 12 ozs.	2 lbs.	1/6
	W-4	SO	3 lbs. 12 ozs.	2 lbs.	1/5
	W-5	SO	4 lbs. 12 ozs.	2 lbs.	1/5
	W-6	SO	5 lbs. 12 ozs.	2 lbs. 4 ozs.	1/4
	W-8	SO	10 lbs.	3 lbs.	1/4

Frigidaire—Continued on Next Page

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
		Frigidaire 1932—Continued			
	W-10	SO	10 lbs.	3 lbs.	1/4
	W-12	SO	11 lbs. 8 ozs.	3 lbs.	1/3
	S-4	SO	3 lbs. 12 ozs.	2 lbs.	1/6
	S-5	SO	4 lbs. 12 ozs.	2 lbs.	1/5
	S-6	SO	4 lbs. 12 ozs.	2 lbs.	1/5
	ML-4	SO	3 lbs. 12 ozs.	2 lbs.	1/6
	ML-5	SO	4 lbs. 12 ozs.	2 lbs.	1/5
	ML-6	SO	4 lbs. 12 ozs.	2 lbs.	1/5
	WP-4	SO	3 lbs. 13 ozs.	2 lbs.	1/6
	WP-5	SO	4 lbs. 12 ozs.	2 lbs.	1/5
	WP-6	SO	5 lbs. 12 ozs.	2 lbs. 4 ozs.	1/4
	WP-8	SO	10 lbs.	3 lbs.	1/4
	WP-10	SO	10 lbs.	3 lbs.	1/4
	WP-13	SO	11 lbs. 8 ozs.	3 lbs.	1/3
	(The ML-4, ML-5 and ML-6 units were also available with F-12.)				
General Electric 1932	Comp. No.	General Electric Co. Nela Park, Cleveland, Ohio			
	E-5	CM-2	2 lbs. 8 ozs.	70 ozs.	1/6
	HE-4	CM-1	2 lbs. 8 ozs.	70 ozs.	1/6
	P-44	DR-1	3 lbs. 8 ozs.	.....	1/10
	P-83	D-30	5 lbs.	.....	1/6
	P-85	D-30	5 lbs.	.....	1/6
	P-110	D-35	5 lbs.	.....	1/6
	P-110	DR-35	6 lbs. 4 ozs.	.....	1/6
	P-134	D-35	5 lbs.	.....	1/6
	P-134	DR-35	6 lbs. 4 ozs.	.....	1/6
	P-170	D-35	5 lbs.	.....	1/6
	P-170	DR-35	6 lbs. 4 ozs.	.....	1/6
	P-170	D-40	8 lbs.	.....	1/3
	P4-180	D-35	5 lbs.	.....	1/6
	P4-180	DR-35	6 lbs. 4 ozs.	.....	1/6
	P4-180	D-40	8 lbs.	.....	1/3
	PS-5	D-2	5 lbs. 12 ozs.	.....	1/8
	PS-45	DR-1	3 lbs. 8 ozs.	.....	1/10
	PS-55	D-2	5 lbs. 12 ozs.	.....	1/8
	PS-62	D-2	5 lbs. 12 ozs.	.....	1/8
	PS-63	D-2	5 lbs. 12 ozs.	.....	1/8
	PS-65	D-2	5 lbs. 12 ozs.	.....	1/8
	PS-95	D-35	5 lbs.	.....	1/6
	PS-13	DR-35	6 lbs. 4 ozs.	.....	1/6
	PS-17	D-35	5 lbs.	.....	1/6
	PS-17	DR-35	6 lbs. 4 ozs.	.....	1/6
	PS-17	D-40	8 lbs.	.....	1/3
	S-44	DR-1	3 lbs. 8 ozs.	.....	1/10
	S-67	D-2	5 lbs. 12 ozs.	.....	1/8
	S-85	D-30	5 lbs.	.....	1/6
	SS-42	DR-1	3 lbs. 8 ozs.	.....	1/10
	SS-62	D-2	5 lbs. 12 ozs.	.....	1/8
	SS-107	D-35	5 lbs.	.....	1/6
	SS-107	DR-35	6 lbs. 4 ozs.	.....	1/6
	SS-140	D-35	5 lbs.	.....	1/6
	SS-140	DR-35	6 lbs. 4 ozs.	.....	1/6
	SD-40	DA-1	3 lbs. 4 ozs.	.....	1/10
	SS-182	D-35	5 lbs.	.....	1/6
	SS-182	DR-35	6 lbs. 4 ozs.	.....	1/6
	SS-182	D-40	8 lbs.	.....	1/3
	(SO refrigerant used on all models.)				
Gibson 1932	Gibson Electric Refrigerator Corp. Greenville, Michigan				
	SG-35	SO	20 ozs.	10 ozs.	1/5
	SG-47	SO	20 ozs.	10 ozs.	1/5
	SG-63	SO	20 ozs.	10 ozs.	1/5
	SG-82	SO	20 ozs.	10 ozs.	1/5

Gibson—Continued on Next Page

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
Gibson 1932—Continued					
	SG-82B	SO	20 ozs.	10 ozs.	1/5
	PG-148	SO	40 ozs.	20 ozs.	(2) 1/5
	SG-37B	SO	20 ozs.	10 ozs.	1/5
	PG-47	SO	20 ozs.	10 ozs.	1/5
	SG-54	SO	20 ozs.	10 ozs.	1/5
	PG-54	SO	20 ozs.	10 ozs.	1/5
	PG-63	SO	20 ozs.	10 ozs.	1/5
	PG-82	SO	20 ozs.	10 ozs.	1/5
Gilfillan 1932	Gilfillan Bros., Inc. 1815 Venice Blvd., Los Angeles, Calif.				
	4170	SO	1 lb. 8 ozs.	12 ozs.	1/6
	5590	SO	1 lb. 8 ozs.	12 ozs.	1/6
Grinnell 1932	Grinnell Washing Machine Corp. Grinnell, Iowa (Refrigeration now discontinued)				
	F	SO	1 lb. 8 ozs.	½ pt.	1/6
	L	SO	1 lb. 8 ozs.	½ pt.	1/6
	G	SO	1 lb. 12 ozs.	½ pt.	1/6
	S	SO	1 lb. 12 ozs.	½ pt.	1/6
	7T	SO	2 lbs.	½ pt.	1/6
Gurney 1932	Gurney Refrigerator Corp. 66 South Brooke St., Fond du Lac, Wisc.				
	4	SO	1 lb. 14 ozs.	1 pt.	1/6
	5	SO	1 lb. 14 ozs.	1 pt.	1/6
	6	SO	1 lb. 14 ozs.	1 pt.	1/6
	8	SO	1 lb. 14 ozs.	1 pt.	1/4
	10	SO	1 lb. 14 ozs.	1 pt.	1/4
	(Sunbeam built these compression units.)				
Ice-O-Matic 1932	Williams Oil-O-Matic Heating Corp. Bloomington, Ill.				
	L-50-T	MC	3.5 lbs.	3 pts.	1/6
	L-60-T	MC	3.3 lbs.	3 pts.	1/6
	LY-40	MC	3.2 lbs.	3 pts.	1/6
	LY-50	MC	3.5 lbs.	3 pts.	1/6
	LY-60	MC	3.3 lbs.	3 pts.	1/6
	PY-50	MC	3.5 lbs.	3 pts.	1/6
	PY-60	MC	3.3 lbs.	3 pts.	1/6
	P-61	MC	4.1 lbs.	3 pts.	1/6
	Y-4	MC	3.2 lbs.	3 pts.	1/6
Jewett 1932	Jewett Refrigerator Corp. 2 Letchworth St., Buffalo, N. Y.				
	Deluxe 80	MC	1 lb.	1 pt.	1/6
	Deluxe 100	MC	1 lb.	1 pt.	1/6
	JK-55	MC	1 lb.	1 pt.	1/6
	JK-65	MC	1 lb.	1 pt.	1/6
	(Above units equipped with Kellogg compressors.)				
Kelvinator 1932	Kelvinator Corp. 14250 Plymouth Road, Detroit, Mich.				
	K-4	SO	3 lbs. 8 ozs.	19 ozs.	1/10
	K-4S	SO	3 lbs. 8 ozs.	19 ozs.	1/6

Kelvinator—Continued on Next Page

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
	Kelvinator 1932—Continued				
	K-5	SO	3 lbs. 8 ozs.	19 ozs.	1/10
	K-5S	SO	3 lbs. 8 ozs.	26 ozs.	1/5
	K-6	SO	3 lbs. 8 ozs.	19 ozs.	1/6
	K-6S	SO	3 lbs. 8 ozs.	26 ozs.	1/5
	K-7	SO	3 lbs. 8 ozs.	26 ozs.	1/5
	K-24	SO	3 lbs. 8 ozs.	19 ozs.	1/10
	K-24S	SO	3 lbs. 8 ozs.	26 ozs.	1/5
	PK-4	SO	3 lbs. 8 ozs.	19 ozs.	1/10
	PK-4S	SO	3 lbs. 8 ozs.	19 ozs.	1/6
	PK-5	SO	3 lbs. 8 ozs.	19 ozs.	1/10
	PK-5S	SO	3 lbs. 8 ozs.	26 ozs.	1/5
	PK-6	SO	3 lbs. 8 ozs.	19 ozs.	1/6
	PK-6S	SO	3 lbs. 8 ozs.	26 ozs.	1/5
	PK-7	SO	3 lbs. 8 ozs.	26 ozs.	1/5
	S-4	SO	2 lbs.	19 ozs.	1/6
	S-5	SO	2 lbs.	19 ozs.	1/6
	S-7	SO	2 lbs.	26 ozs.	1/4
	S-9	SO	2 lbs.	26 ozs.	1/4
	D-6	SO	2 lbs.	19 ozs.	1/6
	D-6S	SO	2 lbs.	26 ozs.	1/4
	D-8	SO	2 lbs.	26 ozs.	1/4
	D-11	SO	2 lbs.	26 ozs.	1/4
	D-14	SO	3 lbs. 8 ozs.	36 ozs.	1/3
	D-22	SO	3 lbs. 8 ozs.	36 ozs.	1/3
Keokuk 1932	**Keokuk Refrigerating Co. Keokuk, Iowa**				
	4-L	SO	2 lbs.	1 qt.	1/6
	5-L	SO	2 lbs.	1 qt.	1/6
	6-L	SO	2 lbs. 8 ozs.	1 qt.	1/6
	8-L	SO	2 lbs. 12 ozs.	1 qt.	1/6
	LT-4	SO	2 lbs.	1 qt.	1/6
	LT-6	SO	2 lbs. 8 ozs.	1 qt.	1/6
	LT-8	SO	2 lbs. 12 ozs.	1 qt.	1/6
	PT-6	SO	2 lbs. 8 ozs.	1 qt.	1/6
	PT-8	SO	2 lbs. 12 ozs.	1 qt.	1/6
King-Kold (also LaSalle & Illinois) 1932	**Illinois Moulding Co. 2411 West 23rd St., Chicago, Ill. (No longer manufacture electric refrigerators)**				
	M-4	SO	4 lbs.	26 ozs.	1/6
	M-5	SO	4 lbs.	26 ozs.	1/6
	M-6	SO	4 lbs.	26 ozs.	1/6
	FL-5	SO	4 lbs.	26 ozs.	1/6
	FL-6	SO	4 lbs.	26 ozs.	1/6
Kulair 1932	**Kulair Corp. 1428 South Penn Square, Philadelphia, Pa. (Now out of business)**				
	A	SO	3 lbs.	1 pt.	1/6
	B	SO	3 lbs.	1 pt.	1/6
	C	SO	3 lbs.	1 pt.	1/6
	D	SO	3 lbs.	1 pt.	1/6
	E	SO	3 lbs.	1 pt.	1/6
	F	SO	3 lbs. 4 ozs.	1 pt.	1/4
	G	SO	3 lbs. 4 ozs.	1 pt.	1/4

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
Lectrik-Ice 1932	Uniflow Mfg. Co. Erie, Pa.				
	42-D	SO	1 lb. 4 ozs.	9 ozs.	1/6
	42-P	SO	1 lb. 4 ozs.	9 ozs.	1/6
	52-D	SO	1 lb. 4 ozs.	20 ozs.	1/6
	52-P	SO	1 lb. 4 ozs.	20 ozs.	1/6
	63-D	SO	1 lb. 4 ozs.	20 ozs.	1/6
	63-P	SO	1 lb. 4 ozs.	20 ozs.	1/6
	84-D	SO	1 lb. 8 ozs.	20 ozs.	1/5
	84-P	SO	1 lb. 8 ozs.	20 ozs.	1/5
	105-P	SO	1 lb. 8 ozs.	44 ozs.	1/4
	C-45-E	SO	1 lb. 4 ozs.	9 ozs.	1/6
	C-45-D	SO	1 lb. 4 ozs.	9 ozs.	1/6
	C-60-D	SO	1 lb. 4 ozs.	9 ozs.	1/6
Leonard 1932	Leonard Refrigerator Co. (Subsidiary of Kelvinator Corp.) 14250 Plymouth Road, Detroit, Mich.				
	A-450	SO	3 lbs. 5 ozs.	1 lb. 3 ozs.	1/10
	A-450S	SO	3 lbs. 5 ozs.	1 lb. 10 ozs.	1/5
	PA-450	SO	3 lbs. 5 o.s.	1 lb. 3 ozs.	1/10
	PA-450S	SO	3 lbs. 5 ozs.	1 lb. 10 ozs.	1/5
	L-400	SO	3 lbs.	1 lb. 3 ozs.	1/10
	L-400	SO	3 lbs. 5 ozs.	1 lb. 3 ozs.	1/6
	L-400S	SO	3 lbs.	1 lb. 3 ozs.	1/6
	L-450	SO	3 lbs. 5 ozs.	1 lb. 3 ozs.	1/10
	L-450S	SO	3 lbs. 5 ozs.	1 lb. 10 ozs.	1/5
	L-550	SO	3 lbs. 5 ozs.	1 lb. 3 ozs.	1/6
	L-550S	SO	3 lbs. 5 ozs.	1 lb. 10 ozs.	1/5
	PL-550	SO	3 lbs. 5 ozs.	1 lb. 3 ozs.	1/6
	PL-550S	SO	3 lbs. 5 ozs.	1 lb. 10 ozs.	1/5
	L-650	SO	3 lbs. 5 ozs.	1 lb. 3 ozs.	1/6
	L-650S	SO	3 lbs. 5 ozs.	1 lb. 10 ozs.	1/5
	L-750	SO	3 lbs. 10 ozs.	1 lb. 10 ozs.	1/5
	PL-750	SO	3 lbs. 10 ozs.	1 lb. 10 ozs.	1/5
Lincoln 1932	Southern California Engineering Co. 734 East 12th St., Los Angeles, Calif. (Discontinued manufacture of refrigerators)				
	L-4	SO	2 lbs.	1 lb.	1/6
	L-5	SO	2 lbs.	1 lb.	1/6
	L-6	SO	2 lbs.	1 lb.	1/6
	P-4	SO	2 lbs.	1 lb.	1/6
	P-5	SO	2 lbs.	1 lb.	1/6
	P-6	SO	2 lbs.	1 lb.	1/6
Majestic 1932	Grigsby-Grunow Co. 5801 Dickens Ave., Chicago, Ill. (No longer manufacturing refrigeration units)				
	140	SO	.....	.....	1/6
	150	SO	.....	.....	1/6
	245	SO	.....	.....	1/6
	255	SO	.....	.....	1/6
	275	SO	.....	.....	1/6
	706	SO	.....	.....	1/6
	710	SO	.....	.....	(2) 1/6
	712	SO	.....	.....	(2) 1/6
	335	SO	4 lbs.	26 ozs.	1/8
	345	SO	4 lbs.	26 ozs.	1/8
	835	SO	4 lbs.	26 ozs.	1/8
	845	SO	4 lbs.	26 ozs.	1/8

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
Mayflower 1932	**Mayflower, Inc. Lima, Ohio**				
(Compressors on following units were of Trupar manufacture)					
	F-34	SO	3 lbs. 8 ozs.	¾ pt.	1/6
	F-35	SO	4 lbs. 8 ozs.	¾ pt.	1/6
	F-36	SO	4 lbs. 8 ozs.	¾ pt.	1/6
	F-55	SO	4 lbs.	¾ pt.	1/6
	F-56	SO	4 lbs.	¾ pt.	1/6
	F-65	SO	4 lbs. 8 ozs.	¾ pt.	1/6
	F-66	SO	4 lbs. 8 ozs.	¾ pt.	1/6
	F-75	SO	5 lbs.	1 pt.	1/5
	F-76	SO	5 lbs.	1 pt.	1/5
	F-86	SO	5 lbs.	1 pt.	1/5
	F-96	SO	5 lbs. 8 ozs.	1 pt.	1/5
M. & E. (Merchant & Evans) 1932	**Merchant & Evans Co. 21st & Washington Aves., Philadelphia, Pa.**				
	Gyro-6	SO	1 lb. 8 ozs.	8 ozs.	1/6
	Gyro-12	SO	1 lb. 8 ozs.	8 ozs.	1/6
	Deluxe-12	SO	1 lb. 8 ozs.	8 ozs.	1/6
	Deluxe-14	SO	1 lb. 8 ozs.	8 ozs.	1/6
Napier 1932	**Metal Saw & Machine Co., Inc. 40 Napier St., Springfield, Mass.**				
	A-4	MC	2 lbs.	1½ pts.	1/6
	A-5	MC	2 lbs. 8 ozs.	1½ pts.	1/6
	A-6	MC	2 lbs. 8 ozs.	1½ pts.	1/6
	A-8	MC	3 lbs.	1½ pts.	1/6
Norge 1932	**Norge Corporation 670 East Woodbridge St., Detroit, Mich.**				
	A	SO	5 lbs.	1¾ pts.	1/6
	B	SO	5 lbs.	1¾ pts.	1/6
	D	SO	5¾ lbs.	1¾ pts.	1/6
	F	SO	5¾ lbs.	1¾ pts.	1/6
	H	SO	3 lbs.	1¾ pts.	1/4
	BP	SO	5 lbs.	1¾ pts.	1/6
	DP	SO	5¾ lbs.	1¾ pts.	1/6
	BWO	SO	5 lbs.	1¾ pts.	1/6
O'Keefe & Merritt 1932	**O'Keefe & Merritt Co. 3700 E. Ninth St., Los Angeles, Calif.**				
	300	MC	1 lb.	½ pt.	1/6
	400	MC	1 lb.	½ pt.	1/6
	450	MC	1 lb.	½ pt.	1/6
	500	MC	1 lb.	½ pt.	1/6
	4580	MC	1 lb. 8 ozs.	1 pt.	1/6
	5510	MC	1 lb. 8 ozs.	1 pt.	1/6
	7014	MC	1 lb. 8 ozs.	1 pt.	1/6
	1122	MC	1 lb. 8 ozs.	1 pt.	1/4
Parker 1932	**H. C. Parker, Ltd. 2600 Santa Fe Ave., Los Angeles, Calif.**				
	300-L	MC	3 lbs.	1 pt.	1/6
	400-LP	MC	3 lbs.	1 pt.	1/6

Parker—Continued on Next Page

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
Parker, 1932—Continued					
	450-LP	MC	3 lbs.	1 pt.	1/6
	500-LP	MC	3 lbs.	1 pt.	1/6
	4580-LP	MC	3 lbs.	1 pt.	1/6
	5510-LP	MC	3 lbs.	1 pt.	1/6
	7014-LP	MC	3 lbs.	1 pt.	1/6
	1122-LP	MC	4 lbs.	1 pt.	1/4
Potter (Tricold) 1932	Potter Refrigerator Corp. 220 Delaware Ave., Buffalo, N. Y.				
	TL-102	MC	1 lb. 8 ozs.	2/3 pt.	1/6
	TL-126	MC	1 lb. 8 ozs.	2/3 pt.	1/6
	TL-145	MC	1 lb. 8 ozs.	2/3 pt.	1/4
	TL-175	MC	1 lb. 8 ozs.	2/3 pt.	1/4
	(Above units were equipped with Universal Cooler compressors)				
Puritan 1932	Quality Products, Inc. 199 Bacon St., Dayton, Ohio (Now out of business)				
	L-42	SO	4 lbs.	20 ozs.	1/6
	L-62	SO	4 lbs.	20 ozs.	1/6
	L-82	SO	5 lbs.	20 ozs.	1/6
	P-48	SO	4 lbs.	20 ozs.	1/6
	P-65	SO	4 lbs.	20 ozs.	1/6
	P-83	SO	5 lbs.	20 ozs.	1/6
	(Used Auto Compressor—See "Republic.")				
Republic 1932	Republic Tool Products Co. 915 Valley St., Dayton, Ohio				
	L-42	SO	4 lbs.	20 ozs.	1/6
	L-62	SO	4 lbs.	20 ozs.	1/6
	L-82	SO	5 lbs.	20 ozs.	1/6
	P-48	SO	4 lbs.	20 ozs.	1/6
	P-65	SO	4 lbs.	20 ozs.	1/6
	P-83	SO	5 lbs.	20 ozs.	1/6
Rice 1932	Rice Products, Inc. 315 Beaubien St., Detroit, Mich. (Now out of business)				
	L-4	MC	1/2 lb.	1/2 lb.	1/6
	P-4	MC	1/2 lb.	1/2 lb.	1/6
	L-5	MC	1/2 lb.	1/2 lb.	1/6
	P-5	MC	1/2 lb.	1/2 lb.	1/6
	L-6	MC	1/2 lb.	1/2 lb.	1/6
	P-6	MC	1/2 lb.	1/2 lb.	1/6
Sanitary 1932	(See 1933 listings, as same models were manufactured in both years)				

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
Servel 1932	Servel, Inc. Evansville, Ind. (No longer producing electric household units)				
	SB-7	MC	1 lb.	1½ pts.	1/8
	CC-4	MC	1 lb. 12 ozs.	1 pt.	1/6
	CC-3C	MC	1 lb. 12 ozs.	1 pt.	1/6
	CC-5B	MC	1 lb. 12 ozs.	1 pt.	1/6
	CC-6	MC	1 lb. 12 ozs.	1 pt.	1/6
	CC-7	MC	1 lb. 12 ozs.	1 pt.	1/6
	CC-9	MC	1 lb. 12 ozs.	1 pt.	1/6
	CC-11	MC	1 lb. 12 ozs.	1 pt.	1/6
Snow Bird 1932	Gilson Mfg. Company York Road, Guelph, Ontario, Canada				
	5-S	SO	4 lbs. 4 ozs.	18 ozs.	1/6
	5	SO	4 lbs. 8 ozs.	18 ozs.	1/6
	7	SO	4 lbs. 8 ozs.	18 ozs.	1/6
	9	SO	5 lbs.	18 ozs.	1/6
	10	SO	5 lbs.	22 ozs.	1/4
	23	SO	6 lbs.	12 ozs.	1/4
	30	SO	6 lbs.	12 ozs.	1/4
Starr-Freeze 1932	The Starr Company Richmond, Ind.				
	R	SO	2 lbs. 8 ozs.	15 ozs.	1/6
	W	SO	2 lbs. 8 ozs.	15 ozs.	1/6
	M	SO	2 lbs. 8 ozs.	15 ozs.	1/6
	O	SO	2 lbs. 8 ozs.	15 ozs.	1/6
	P	SO	2 lbs. 8 ozs.	15 ozs.	1/6
	F	SO	5 lbs.	22 ozs.	1/4
	G	SO	6 lbs.	22 ozs.	1/3
Stewart-Warner 1932	Stewart-Warner Corp. 1826 Diversey Parkway, Chicago, Ill.				
	88	SO	4 lbs. 4 ozs.	1¼ pts.	1/6
	89	SO	4 lbs. 4 ozs.	1¼ pts.	1/6
	90	SO	4 lbs. 4 ozs.	1¼ pts.	1/6
	91	SO	4 lbs. 4 ozs.	1¼ pts.	1/6
	92	SO	4 lbs. 4 ozs.	1¼ pts.	1/6
U. S. Hermetic 1932	United States Radio & Television Corp., Marion, Ind. (Merged with General Household Utilities) (Refrigeration division of the U. S. Hermetic purchased by Rex Refrigeration Service Co., Chicago)				
	AL	SO	5 lbs. 8 ozs.	1100 cc	1/8
	AP	SO	5 lbs. 8 ozs.	1100 cc	1/8
	CL	SO	5 lbs.	1100 cc	1/8
	CP	SO	5 lbs.	1100 cc	1/8
	DL	SO	4 lbs. 8 ozs.	1100 cc	1/8
Universal Cooler 1932	Universal Cooler Corp. Melville at Green Ave., Detroit, Mich.				
	L-32	MC	1 lb. 8 ozs.	⅔ pt.	1/6
	L-452	MC	1 lb. 8 ozs.	⅔ pt.	1/6

Universal Cooler—Continued on Next Page

Make	Model No.	Refrigerant Used	Refrigerant Charge	Oil	Motor Size
		Universal Cooler, 1932—Continued			
	L-552	MC	1 lb. 8 ozs.	⅔ pt.	1/6
	P-552	MC	1 lb. 8 ozs.	⅔ pt.	1/6
	L-652	MC	1 lb. 8 ozs.	⅔ pt.	1/6
	P-652	MC	1 lb. 8 ozs.	⅔ pt.	1/6
	L-82	MC	1 lb. 8 ozs.	⅔ pt.	1/6
	P-82	MC	1 lb. 8 ozs.	⅔ pt.	1/6
	LP-3.5	MC	1 lb. 8 ozs.	⅔ pt.	1/6
	LP-4.5	MC	1 lb. 8 ozs.	⅔ pt.	1/6
	LP-5.5	MC	1 lb. 8 ozs.	⅔ pt.	1/6
	LP-6.5	MC	1 lb. 8 ozs.	⅔ pt.	1/6
	P-5.5	MC	1 lb. 8 ozs.	⅔ pt.	1/6
	P-6.5	MC	1 lb. 8 ozs.	⅔ pt.	1/6
Ward 1932	**Montgomery Ward & Co. Chicago, Illinois**				
	LW-30	SO	16 ozs.	8 ozs.	1/5
	LW-40	SO	16 ozs.	8 ozs.	1/5
	LW-55	SO	16 ozs.	8 ozs.	1/5
	LW-75	SO	16 ozs.	8 ozs.	1/5
	PW-30	SO	16 ozs.	8 ozs.	1/5
	PW-40	SO	16 ozs.	8 ozs.	1/5
	PW-55	SO	16 ozs.	8 ozs.	1/5
	PW-75	SO	16 ozs.	8 ozs.	1/5
	(Trukold compressors used on above models)				
Westinghouse 1932	**Westinghouse Electric & Mfg. Co. Mansfield, Ohio**				
	AL-45	SO	2 lbs. 6 ozs.		1/8
	AP-45	SO	2 lbs. 6 ozs.		1/8
	AL-60	SO	4 lbs. 9 ozs.		1/8
	AP-60	SO	4 lbs. 9 ozs.		1/8
	AL-73	SO	4 lbs. 9 ozs.		1/8
	AP-73	SO	4 lbs. 9 ozs.		1/8
	AL-90	SO	4 lbs. 9 ozs.		1/8
	AP-90	SO	3 lbs. 6 ozs.		1/4
	AP-90	SO	4 lbs. 9 ozs.		1/8
	AP-90	SO	3 lbs. 6 ozs.		1/4
	AP-130	SO	9 lbs.		1/4
	AP-200	SO	9 lbs.		1/4
White Mountain 1932	**Maine Mfg. Company Nashua, N. H.**				
	M-45	MC	1 lb. 4 ozs.	½ lb.	1/6
	M-57	MC	1 lb. 4 ozs.	½ lb.	1/6
	M-70	MC	1 lb. 4 ozs.	½ lb.	1/6
	M-90	MC	1 lb. 4 ozs.	½ lb.	1/6
	M-110	MC	1 lb. 4 ozs.	½ lb.	1/6
	(Above units used Sturtevant compressors.)				
Zerozone 1932	**Zerozone Refrigeration Corp. 1331 Holden Avenue, Detroit, Michigan**				
	405	SO	4 lbs. 4 ozs.	⅝ pt.	1/8
	505	SO	4 lbs. 4 ozs.	⅝ pt.	1/8
	556	SO	4 lbs. 4 ozs.	⅝ pt.	1/8
	708	SO	4 lbs. 4 ozs.	⅝ pt.	1/6
	758	SO	4 lbs. 4 ozs.	⅝ pt.	1/6
	P-536	SO	4 lbs. 4 ozs.	⅝ pt.	1/6
	P-656	SO	4 lbs. 4 ozs.	⅝ pt.	1/6
	P-808	SO	4 lbs. 4 ozs.	⅝ pt.	1/6

Want *Information*?

Use The R. S. E. SERVICE DEPARTMENT

—It's for Your Convenience

THIS department is conducted for the convenience of our subscribers. We will ask the manufacturers and distributors to send you the latest information on the items checked.

- ☐ Belts
- ☐ Blow Torches
- Blowers (see Unit Blowers)
- ☐ Books
- ☐ Brushes, Motor
- ☐ Bushings, Motor
- ☐ Carbon Tetrachloride
- ☐ Charging Hose
- ☐ Charging Stand

- Coils
  - ☐ Fin
  - ☐ Pipe
- ☐ Compressors
- Condensers
  - ☐ Air Cooled
  - ☐ Water Cooled
- ☐ Condenser Water Regulators
- ☐ Connecting Rods
- Controls
  - ☐ Cold
  - ☐ Humidity
  - ☐ Liquid Level
  - ☐ Pressure
  - ☐ Temperature
  - ☐ Thermostatic
  - ☐ Water
- ☐ Domestic Evaporators
- Dehydrants
  - ☐ Activated Alumina
  - ☐ Calcium Chloride
- ☐ Dehydrators
- Door Seals (see Gaskets)
- ☐ Drums, Service
- ☐ Dryers

- Evaporators
  - ☐ Dry
  - ☐ Flooded
- ☐ Fan and Pulley Assemblies
- Filters (see Strainers)
- ☐ Float, High Side
- ☐ Float Valve Seats
- Fittings
  - ☐ Flared
  - ☐ Streamline
- Gaskets
  - ☐ Compresser
  - ☐ Door
- ☐ Gasket Material
- ☐ Gasket Tackers
- ☐ Goggles
- ☐ Gauges, Service
- ☐ Hardware, Refrigerator
- ☐ Leak Detectors
- ☐ Lapping Compound and Materials
- ☐ Liquid Indicator
- ☐ Lubricating Oils
- ☐ Low Side Float Switches
- ☐ Low water
- ☐ Motors
- ☐ Needles, Float Valve
- ☐ Oil Return
- Packing
  - ☐ Fabric
  - ☐ Metallic
- ☐ Piston Pins
- ☐ Piston Rings
- ☐ Porcelain Refrigerator Cement
- ☐ Pumps, Circulating
- ☐ Receivers
- Recording Instruments
  - ☐ Humidity
  - ☐ Running Time
  - ☐ Temperature
- Refrigerants
  - ☐ Sulphur Dioxide
  - ☐ Methyl Chloride
  - ☐ Carrene
  - ☐ Freon
  - ☐ Iso Butane
  - ☐ Ethyl Chloride
- Refrigerator Dishes
  - ☐ Glass
  - ☐ Porcelain
- ☐ Safety Masks
- ☐ Seals, Shaft
- ☐ Resurfacing Stones
- Strainers
  - ☐ Expansion and Float Valve
  - ☐ Liquid Line
  - ☐ Suction Line
- Switches
  - ☐ Air Temperature
  - ☐ High Pressure Control
  - ☐ Low Pressure Control
  - ☐ Pressure
  - ☐ Temperature
- ☐ Mercury
- Thermostats
  - ☐ Air Temperature (Cooling)
  - ☐ Air Temperature (Heating)
  - ☐ Brine
  - ☐ Domestic Refrigeration
  - ☐ Industrial Refrigeration
- Thermometers
  - ☐ Refrigerator
  - ☐ Test
- ☐ Tool Chests
- Tools
  - ☐ Flaring
  - ☐ Pinchoff
  - ☐ Tube Bender
  - ☐ Tube Cutter
  - ☐ Wrench Sets
- ☐ Trap, Scale
- ☐ Trays, Ice Cube
- Tubing
  - ☐ Copper
  - ☐ Finned
  - ☐ Steel
  - ☐ Tinned
- ☐ Unit Blowers
- Valves
  - ☐ Automatic Expansion
  - ☐ By Pass
  - ☐ Check
  - ☐ Compressor
  - ☐ Expansion
  - ☐ Flapper
  - ☐ Magnetic
  - ☐ Pressure Reducing
  - ☐ Shutoff
  - ☐ Solenoid
  - ☐ Thermostatic Expansion
  - ☐ Two-Temperature
  - ☐ Water
- ☐ Valve Retainers
- ☐ Valve Stems

Write in Names of Products Not Listed

Name .....

Address .....

City and State .....

Business .....

Mail This Page to the

Refrigeration Service Engineer 433 N. Waller Ave., Chicago, Ill.

The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment as well as oil burners to "The Question Box." The following questions are answered by Mr. George H. Clark.

SNAP-ACTION VALVES

QUESTION 212. I have just read in a Kelvinator refrigerator manual that a snap-action two-temperature valve should never be used on a job where the condensing unit doesn't run often, and gave as an example a dairy job using a brine tank to cool an aerator and a separate storage box such as a walk-in box to store milk.

Will you please advise me why a snap-action two-temperature valve would not be satisfactory on such equipment?

If the brine tank has an ice maker and the refrigerant were methyl chloride and ice was pulled twice a day, I would set the pressure control switch to cut out at 5 or 6 lbs. and in at 18 or 20 lbs. pressure; if the evaporating coil in the storage box was a natural convection type, I would cut the snap-action valve out at 8 lbs. and in at 25 lbs.; if it were a forced convection coil, I would cut the snap-action valve out at 12 or 13 lbs. and in at 25 or 28 lbs.

I don't understand why the valve wouldn't work satisfactorily, especially if a check valve were installed in the suction line of the brine tank to keep the warm gas from the storage box evaporator entering the brine tank evaporator coil. If the storage box was overworked, no doubt the brine would cool down to an unnecessarily low temperature. Could this, if it were the case, be overcome by setting the control switch at a higher pressure, and also the snap-action valve, or using a snap-action valve in both brine tank and storage box suction lines and using a surge tank for the compressor to pump down when both snap-actions were closed at the same time? In that way, both temperatures would be entirely independent of each other. If you didn't run into defrosting trouble of the storage box evaporating coil, you could install a thermostatic pressure regulating valve in both suction lines, and let the temperature of the storage box and brine regulate the opening of the valve, and thereby regulate the temperature of both the brine and storage box and cut the control switch out for the lowest brine temperature still using a check valve, or you could use thermostats that control a liquid line solenoid valve and allow each coil to pump down, eliminating a surge tank.

All this is not only to find out why Kelvinator does not recommend a snap-action valve in this case, but also to help solve the question of multiple temperatures with one condensing unit at the lowest cost. It wouldn't be such a problem except for cost. You can always use thermostats, solenoid valves in liquid and suction lines and surge tanks, but there is the cost.

ANSWER: I can see no particular reason why a snap-action two-temperature valve should not be used in connection with the coil of a storage box while the brine tank used to cool an aerator is to operate from the same condensing unit. In fact I do not believe any check valve would be required in such an installation. I could not tell you why Kelvinator specifies that the snap-action two-temperature valve should not be used. We have a drawing by another refrigerating concern here which pictures just that type of installation, where a snap-action two-temperature valve is used in the suction line of a coil which is to operate on a defrosting cycle in a storage box while the suction side of the compressor is connected directly to the outlet of the coil in the brine tank which supplies the aerator with cold brine.

It will be important, however, to set the pressure control at the machine for the conditions which you want to obtain in the brine tank itself and the snap-action valve will be the only device used to regulate the operation of the storage box coil. I would suggest that a natural convection coil setting of 8 to 25 pounds as you suggest would be satisfactory for a methyl chloride job. The pressure control which is to take

care of the brine tank, I would suggest, should cut-out at pressures somewhere between zero and 4 pounds and cut-in approximately 10 pounds higher. If you could have the cut-in 12 pounds higher than the cut-out but still not have it much above the cut-out pressure of the natural convection coil, that would be better.

NORGE SEAL

Question 213. I am experiencing seal trouble with two small commercial Norge Rollators. The refrigerant is CH_3CL. I would like to know if you have had any experience of this kind.

The first is a one-half-hp. Norge Rollator unit which cools a small walk-in cooler, a beer tap box wound with 40 ft. of three-eighths inch tubing, and a Coca Cola bottle cooler, wound with 50 ft. of three-eighths-inch tubing. I had installed this job about one month when it started a seal leak. The company replaced the unit with a new compression unit. This one was in about three months, and then again leaked at the seal. Could it be that too much oil is being carried over into these handmade coils, and not returning to the Rollator? This job uses three thermostatic expansion valves.

The other is a three-quarter-hp. Norge unit, cooling a walk-in cooler. It has one large finned coil, with a thermostatic expansion valve. This job has been in about eleven months, but has a few pounds of extra methyl in it, so I believe it has been leaking for sometime. There was absolutely no gas in it when I checked it, and the Rollator and flywheel were covered with oil. I replaced the Rollator and recharged the machine.

In an installation using a dry coil for a display case with the compressor on the same floor—the compressor is behind the display case. Is it best to run the tubing over the floor, or underneath the floor? I should think dipping the suction line underneath the floor would cause an oil trap, or does it?

Answer: I do not know how to explain your particular difficulty with the Norge seal on their commercial Rollator. One reason, of course, for seal trouble on this type of compressor is that the seal is on the high pressure side of the system so that the seal has to hold the gas in the compressor at the high pressure from getting out into the atmosphere. With the seal on the low pressure side of the compressor the seal has to hold the gas in the low pressure side from getting out into the atmosphere.

I have had some experience with compressors of this type which have not had the oil return to the compressor properly. In one case we had the head of the Norge sulphur dioxide compressor reversed with the result that the oil thrown up by the compressor was carried in the discharge line into the condenser which soon left the compressor low on oil, with the result that the seal heated up and burned out the rubber ring in a very short time and also the seal surfaces themselves showed an extremely high rate of wear. It may be that you are, as you suggest, getting oil over into your coils which is not returning properly. I would suggest that you check your direction of refrigerant flow to be sure that the refrigerant enters the top of the coil and returns to the suction line from the bottom.

It makes little difference whether or not the suction line is run over or under the floor provided there is only one coil connected through this suction line to the machine. Any oil traps would have little effect in such a line as all the gas returning through the suction line would tend to wash the oil through so that it would not collect in this trap.

MOTOR CONDENSERS

Question 214. Is there any way of restoring the capacity to a condenser which has lost most of its capacity?

The condenser referred to is a 100 mfd., 110 volts, used on condenser start motors. It is found that the substance used between the tinfoil of the condenser settles at the bottom. Is there any way of flowing the substance back to restore the capacity?

Answer: I would suggest that it would be much cheaper and more satisfactory to get a new condenser than to try to repair the old one which has lost capacity. The only way I know of repairing the condenser would be to take it completely apart and rebuild it but I do not believe this would be a paying proposition.

PRESSURE VS. BOILING POINTS

Question 215. Does the saturated vapor pressure govern definitely the boiling point of a refrigerant? What is the boiling point of Carrene in a 30 inch vacuum? What is the boiling point of water in a 30 inch vacuum? What is considered a mechanically perfect vacuum at 700 foot altitude?

Answer: The vapor pressure does govern definitely the boiling point of a refrigerant. At 700 foot altitude the atmospheric

pressure under normal conditions would be approximately 14.34 pounds, per square inch absolute pressure. This would be equivalent to 29.2 inches of mercury so that a vacuum of 29.2 inches would be a perfect vacuum and, of course, a 30 inch vacuum would be unattainable. The boiling of the fluid decreases as the pressure is lowered and the boiling point becomes as low as the freezing point at which temperature the liquid will freeze as it boils and as the pressure is further reduced the temperature at which the solid vaporizes or sublimes is further reduced.

In the case of CO_2 its freezing point is approximately —75 degrees and as the pressure on a tank of CO_2 is reduced it will chill down to the —75 degrees temperature when the boiling of the liquid in removing heat causes the remaining liquid to freeze to the solid form and as the pressure is further reduced to atmospheric pressure the temperature at which the solid CO_2 sublimes is reduced to —108 degrees.

At 700 foot altitude under normal conditions Carrene should boil at zero degrees at approximately 28.2 inches vacuum. It would boil at 10 degrees at 26.5 inches vacuum and you should be able to estimate from these figures the boiling point you will have at other pressures in that neighborhood.

Water boils at 32 degrees at an absolute pressure of .1804 inches of mercury. At a barometer of 29.2 inches this would be a vacuum of about 29.02 inches.

At lower pressures ice turns directly into steam. At a 29.2 inches barometer and a vacuum of 29.14 inches ice turns directly into steam at 10 degrees F.

AIR COOLED CONDENSERS WITHOUT FANS

Question 216. Can you give a formula for calculating air-cooled condensers? Is it possible to have an air-cooled condenser without a blower or fan? If so, what would have to be done to accomplish heat transfers?

Answer: Your question has aroused some interest and I am setting up an apparatus in order to investigate the heat transfer from the usual fin type of condensers both with and without a blower to provide air circulation; probably this information will be contained in an issue of Refrigeration Service Engineer very shortly. Investigations in the past have indicated that we may depend upon a heat transfer of two B.t.u.'s per square foot, per degree temperature difference, per hour from air to a cooling surface with natural air circulation, while further investigations seem to indicate that due to radiation we may be able to transfer very close to three B.t.u.'s per square foot, per degree temperature difference, per hour from a heating surface to normally circulating air. Further data on this will be contained in the RSE shortly.

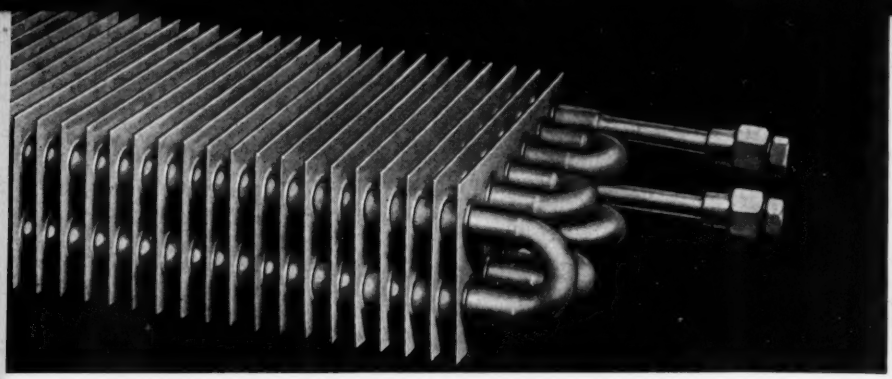
SPARTON REFRIGERATOR

Question 217. The 1934 Sparton refrigerator unit, top mounting two cylinder type, service notes call for a six inch vacuum setting. To set as per factory service notes, it is impossible to keep the suction line from frosting to the compressor. I find that the compound gauge must read from 10-in. to 14-in. vacuum to keep line clean. However, at this setting the cycle seems to be excessive. These machines are equipped with a Mayson expansion valve, markings are R C 6-R A 7. I have tried new valves of the same type received from the factory and they all work alike.

I have about 100 of these machines to service, and would appreciate any suggestion you might offer as to how to remedy the matter.

Six Inch Setting Right

Answer: I would say that the six inch vacuum setting should be the proper setting for a unit of the Sparton type. In some cases an eight inch vacuum might be satisfactory, but I do not believe the vacuum should ever be maintained as low as 10 to 14 inches. There is some question as to how extensive the frost back is with the six inch setting. If the line is only frosted approximately to the compressor and the inlet of the compressor is not quite cold, I would say that the frost is simply due to the fact that the cold vapor returning to the compressor has not had a chance to warm up to the freezing point and the fact that the refrigerant returns to the compressor cold tends to increase the capacity of the compressor. I would not make any attempt to keep the line entirely free from frost. If the machine cycles properly with a six to eight inch setting I would let it go at that. If it does not cycle on the six to eight inch setting I would investigate the control and see that the bulb is properly clamped to the evaporator and if it continues to run without shutting off I would check the control for setting. There is no indication that your trouble is due to the expansion valve at all. If the expansion valve maintains the proper suction pressure it is taking care of its full duty.



HOW FEDDERS COILS DO MORE THAN SIMPLY REFRIGERATE

Fedders Non-Frost Coils for commercial refrigeration in display cases, reach-in cabinets, and market coolers combine correct temperatures with proper relative humidity and circulation.

Fedders coils make it possible to secure ideal conditions of humidity by operating the coils at a warmer temperature than is possible where a relatively small amount of tubing is provided.

This can be compared to the use of an undersized furnace which has to be "forced" (or operated at a higher temperature) as contrasted to a large furnace which has ample capacity to heat a house without necessity for operating the furnace at a high temperature.

Conversely, the added refrigerant capacity of Fedders Coils operates in much the same way, and as a result, cor-

FEDDERS MANUFACTURING COMP

ATLANTA BOSTON CHICAGO CINCINNATI DALLAS

FEDDERS REFRIGERATION SUPPLI

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Fedders Manufacturing Co.
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BINGHAMTON, N. Y.
Service Supply Co.

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Parsons Bros.

BROOKLINE, MASS.
Refrigeration Supply Co.

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DENVER, COLO.
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DETROIT, MICH.
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Enochs Sales Company

FORT WORTH, TEXAS
McKinley Refrigeration Supply Co.
Shield Company, Inc.

GREENSBORO, N. C.
Home Appliance Service Co.

HARRISBURG, PA.
Melchior, Armstrong, Dessau Co.

HARTFORD, CONN.
Marsden & Wasserman

HEMPSTEAD, L. I.
Sid Harvey, Inc.

HOUSTON, TEXAS
Walter Refrigeration Supply Co.

INDIANAPOLIS, IND.
Langsenkamp Company

JACKSON, MISS.
Enochs Sales Co.

JACKSONVILLE, FLA.
Jamita Company

JAMAICA, L. I.
Sid Harvey, Inc.

KANSAS CITY, MO.
Forslund Pump & Machinery Co.
Natkin & Company

LANCASTER, PA.
M. & E. Refrigeration Accessories Co.

LITTLE ROCK, ARK.
Reynolds-Brown Supply Co.

LONG BEACH, CALIF.
Allied Refrigeration

Co ete Lines of Fedders
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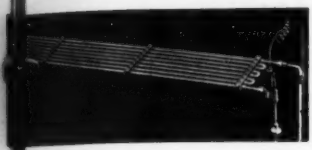

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cooling is provided without operat-
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tures which also lowers the Relative
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ve dehydration and shrinkage of
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ue to the compact design of Fedders
, it is possible to locate them in a
lay case, reach-in cabinet or market
er, in the most effective position
n a standpoint of proper circulation
out robbing display and storage
e.

DEATH VALLEY IS SOAKING WET COMPARED TO FEDDERS ABSOLUTE DEHYDRATION

The interior of Fedders refrigeration products is dehydrated under vacuum in electric ovens. Electric heating elements maintain a temperature of 200 to 220 degrees Fahrenheit under automatic recording thermostatic control. The heat is circulated throughout each oven by circulating fans to assure uniform temperature throughout the oven.

Each coil, expansion valve or other product is held under 28 inch vacuum throughout the drying period. This lowers the boiling point of water and any vapor is immediately carried off.

Each FEDDERS Refrigeration Product is immediately sealed following dehydration.

Above: Heavy duty vacuum pump used in dehydrating process.

Below: One of several batteries of Fedders Dehydrating Ovens.

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Refrigeration Supply Co.

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VANCOUVER, B. C.
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WHITE PLAINS, N. Y.
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Velocities in Suction Mains and Evaporators

First of a Series of Articles and Tables Giving Velocities in Suction Mains and Evaporators with Maximum Load Carrying Capacity of Coils for Various Refrigerants—Succeeding Articles and Tables Will Cover the Selection of the Proper Size Suction Mains for Use with Large or Small Refrigerating Plants—Examples

By J. O. SCHULTZ *

TO PERMIT the easy selection of the proper size suction mains for use with large or small refrigeration plants and to determine the velocities in mains and evaporators the accompanying tables have been prepared for the four common refrigerants now in use: Ammonia, Methyl Chloride, Dichlorodifluoromethane, and Sulphur Dioxide.

The use of these tables will eliminate long tedious calculations at a great saving of time, and should prevent the practice, so often indulged in, of making a hasty guess.

In preparing the tables consideration was given to the recommended practice of making computations on the B.t.u. per hour basis, particularly in the smaller size plants.

As an example, in succeeding articles a small refrigeration plant will be outlined. The number of coils, together with their connections and suction mains, will be selected from the tables. The identical example will be worked out in three of the refrigerants so that comparisons can be readily made.

It is not the intention of this article to make any definite recommendations as to what is the best refrigerant to use for a plant of this kind, as this article is for reference with any refrigerant.

Anhydrous Ammonia

Investigating to determine the proper size of pipe to use for suction mains in refrigerating systems using anhydrous ammonia, NH_3, I find that the accepted velocity of 5000 ft. per minute, which has had many years of practical use, varies under different temperatures. The velocity to be used for suction mains should be decreased as the temperature is raised, the gas becoming denser, and increased as the temperature is lowered due to the lighter gas. Table I. shows the velocities in suction mains and evaporators carrying anhydrous ammonia.

A second article on Velocities in Suction Mains and Evaporators covering methyl chloride will appear in the September issue. Succeeding articles will include those gases used most extensively today.

* Chief Engineer, Rempe Co., Chicago.

XYLENE

IN VIEW of the many requests for information on Xylene, received from the readers of THE REFRIGERATION SERVICE ENGINEER, it has been thought advisable to publish all the information obtained to date from various sources.

From The Barrett Co., 40 Rector St., New York, N. Y., who manufacture this product, we have the following information:

Xylene is a light distillate from coal tar, and is an excellent solvent used in the paint, varnish and lacquer industry. It is of the aromatic series of hydrocarbons, starting with benzene. Its formula is C_8H_{10}. Another name for Xylene, based on its chemical formula, is Dimethyl-benzene.

The Barrett Co. has supplies available in 50-gallon drums at their branches in Boston, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Los Angeles, Newark, New York, Philadelphia, St. Louis and San Francisco. In smaller quantities, it may be obtained from The Barrett Co., Margaret and Bermuda Sts., Frankford, Philadelphia, Pa.

From a report issued November 15, 1934, by E. I. du Pont de Nemours & Co., Inc., we have the following:

"While we have had no experience with the use of Xylene in connection with SO_2 machines, we would venture the opinion that it can be used satisfactorily for cleaning

(Continued on page 61)

TABLE I - Velocity in Suction Mains and Evaporators With Maximum Load Carrying Capacities of Coils

NH_3 Anhydrous Ammonia—86° Condensing Temp.—Liquid Heat Content 138.9

Suction Temp. °Fahr.	Vapor Volume Cu. Ft., per Lb.	Velocity in Suction Main, Ft. per Min.	Heat Content of Liquid at Evap. Temp.	B.t.u. to Cool Liq. to Evaporator Temp.	Latent Heat of Vaporization	Per Cent Vaporized to Cool Liquid	Velocity at Coil Outlet, Ft. per Min.	Heat Content of Vapor	Vapor Heat Less Liquid Heat	Lbs. of Refrigerant Circulated per Min. per Ton Refrig.	Displacement Cu. In. per Min. per Ton Refrigeration	Maximum Load Carrying Capacity of Single Continuous Coils							
												¾ In. X Pipe 0.433 Sq. In. Area		1 In. X Pipe 0.719 Sq In. Area		1¼ In. X Pipe 1.283 Sq. In. Area		2 In. X Pipe 2.953 Sq. In. Area	
												Tonnage	B.t.u. per Hour	Tonnage	B.t.u. per Hour	Tonnage	B.t.u. per Hour	Tonnage	B.t.u. per Hour
-20	14.68	6710	21.4	117.5	583.6	20.1	1343	605.0	466.1	0.4291	10885	0.641	7692	1.064	12768	1.899	22788	4.372	52464
-18	13.97	6547	23.5	115.4	582.2	19.8	1307	605.7	466.8	0.4284	10342	0.657	7884	1.091	13092	1.947	23364	4.481	53772
-16	13.29	6384	25.6	113.3	580.8	19.5	1271	606.4	467.5	0.4278	9824	0.672	8064	1.116	13392	1.991	23892	4.583	54996
-14	12.66	6232	27.8	111.1	579.3	19.2	1238	607.1	468.2	0.4272	9345	0.688	8256	1.142	13704	2.039	24468	4.692	56304
-12	12.06	6083	30.0	108.9	577.8	18.8	1204	607.8	468.9	0.4265	8888	0.704	8448	1.169	14028	2.086	25032	4.801	57612
-10	11.50	5939	32.1	106.8	576.4	18.5	1173	608.5	469.6	0.4259	8463	0.720	8640	1.196	14352	2.133	25596	4.910	58920
-8	10.97	5801	34.3	104.6	574.9	18.2	1143	609.2	470.3	0.4253	8081	0.735	8820	1.220	14640	2.178	26136	5.013	60156
-6	10.47	5667	36.4	102.5	573.4	17.9	1114	609.8	470.9	0.4247	7684	0.753	9036	1.250	15000	2.231	26772	5.135	61620
-4	9.99	5536	38.6	100.3	571.9	17.5	1084	610.5	471.6	0.4241	7321	0.769	9228	1.277	15324	2.279	27348	5.245	62940
-2	9.54	5410	40.7	98.2	570.4	17.2	1057	611.1	472.2	0.4235	6981	0.787	9444	1.307	15684	2.332	27984	5.367	64404
0	9.12	5289	42.9	96.0	568.9	16.9	1030	611.8	472.9	0.4229	6664	0.803	9636	1.333	15996	2.379	28548	5.476	65712
-1	8.91	5228	44.0	94.9	568.1	16.7	1017	612.1	473.2	0.4226	6506	0.812	9744	1.348	16176	2.406	28872	5.538	66456
2	8.71	5168	45.1	93.8	567.3	16.5	1003	612.4	473.5	0.4224	6358	0.820	9840	1.362	16344	2.430	29160	5.592	67104
3	8.52	5112	46.2	92.7	566.5	16.4	992	612.7	473.8	0.4221	6215	0.828	9936	1.375	16500	2.453	29436	5.647	67764
4	8.33	5055	47.2	91.7	565.8	16.2	979	613.0	474.1	0.4219	6073	0.838	10056	1.391	16692	2.483	29796	5.715	68580
5	8.15	5000	48.3	90.6	565.0	16.0	967	613.3	474.4	0.4216	5937	0.846	10152	1.405	16860	2.507	30084	5.770	69240
6	7.97	4944	49.4	89.5	564.2	15.9	955	613.6	474.7	0.4213	5802	0.855	10260	1.420	17040	2.533	30396	5.831	69972
7	7.80	4892	50.5	88.4	563.4	15.7	943	613.9	475.0	0.4211	5676	0.863	10356	1.433	17196	2.557	30684	5.886	70632
8	7.63	4837	51.6	87.3	562.7	15.5	931	614.3	475.4	0.4207	5547	0.872	10464	1.448	17376	2.584	31008	5.947	71364
9	7.46	4783	52.7	86.2	561.9	15.3	919	614.6	475.7	0.4204	5419	0.881	10572	1.463	17556	2.610	31320	6.008	72096
10	7.30	4731	53.8	85.1	561.1	15.2	908	614.9	476.0	0.4202	5300	0.890	10680	1.478	17736	2.637	31644	6.070	72840

TABLE I - CONT. - Velocity in Suction Mains and Evaporators With Maximum Load Carrying Capacities of Coils

NH_3 Anhydrous Ammonia—86° Condensing Temp.—Liquid Heat Content 138.9

11	7.15	4683	54.9	84.0	560.3	15.0	898	615.2	476.3	0.4199	5188	0.899	10788	1.493	17916	2.664	31968	6.131	73572
12	7.00	4634	56.0	82.9	559.5	14.8	887	615.5	476.6	0.4196	5075	0.908	10896	1.508	18096	2.690	32280	6.192	74304
13	6.85	4584	57.1	81.8	558.7	14.6	876	615.8	476.9	0.4194	4964	0.915	10980	1.519	18228	2.711	32532	6.240	74880
14	6.70	4533	58.2	80.7	557.9	14.5	865	616.1	477.2	0.4191	4852	0.926	11112	1.538	18456	2.744	32928	6.315	75780
15	6.56	4485	59.2	79.7	557.1	14.3	854	616.3	477.4	0.4189	4749	0.934	11208	1.551	18612	2.767	33204	6.370	76440
16	6.43	4442	60.3	78.6	556.3	14.1	845	616.6	477.7	0.4187	4652	0.944	11328	1.568	18816	2.797	33564	6.438	77256
17	6.29	4393	61.4	77.5	555.5	14.0	835	616.9	478.0	0.4184	4548	0.954	11448	1.584	19008	2.827	33924	6.506	78072
18	6.16	4347	62.5	76.4	554.7	13.8	824	617.2	478.3	0.4181	4450	0.962	11544	1.597	19164	2.850	34200	6.561	78732
19	6.03	4302	63.6	75.3	553.9	13.6	815	617.5	478.6	0.4179	4355	0.972	11664	1.614	19368	2.880	34560	6.629	79548
20	5.91	4258	64.7	74.2	553.1	13.4	805	617.8	478.9	0.4176	4265	0.981	11772	1.629	19548	2.907	34884	6.690	80280
21	5.79	4214	65.8	73.1	552.2	13.2	795	618.0	479.1	0.4174	4176	0.989	11868	1.642	19704	2.930	35160	6.745	80940
22	5.67	4170	66.9	72.0	551.4	13.1	786	618.3	479.4	0.4172	4088	0.999	11988	1.659	19908	2.960	35520	6.813	81756
23	5.56	4130	68.0	70.9	550.6	12.9	777	618.6	479.7	0.4169	4006	1.008	12096	1.674	20088	2.987	35844	6.874	82488
24	5.44	4084	69.1	69.8	549.8	12.7	767	618.9	480.0	0.4167	3917	1.017	12204	1.689	20268	3.013	36156	6.936	83232
25	5.33	4044	70.2	68.7	548.9	12.5	758	619.1	480.2	0.4165	3836	1.027	12324	1.705	20460	3.043	36516	7.004	84048
26	5.23	4006	71.3	67.6	548.1	12.3	750	619.4	480.5	0.4162	3761	1.036	12432	1.720	20640	3.070	36840	7.065	84780
27	5.12	3964	72.4	66.5	547.3	12.2	741	619.7	480.8	0.4160	3680	1.046	12552	1.737	20844	3.099	37188	7.134	85608
28	5.02	3925	73.5	65.4	546.4	12.0	733	619.9	481.0	0.4158	3607	1.056	12672	1.753	21036	3.129	37548	7.202	86424
29	4.92	3885	74.6	64.3	545.6	11.8	724	620.2	481.3	0.4155	3533	1.065	12780	1.768	21216	3.156	37872	7.263	87156
30	4.83	3850	75.7	63.2	544.8	11.6	716	620.5	481.6	0.4153	3466	1.073	12876	1.782	21384	3.179	38148	7.318	87816
31	4.73	3809	76.8	62.1	543.9	11.4	707	620.7	481.8	0.4151	3393	1.083	12996	1.798	21576	3.209	38508	7.386	88632
32	4.64	3773	77.9	61.0	543.1	11.2	699	621.0	482.1	0.4149	3327	1.092	13104	1.813	21756	3.236	38832	7.447	89364
33	4.55	3736	79.0	59.9	542.2	11.0	691	621.2	482.3	0.4147	3260	1.101	13212	1.828	21936	3.262	39144	7.509	90108
34	4.46	3699	80.1	58.8	541.4	10.9	684	621.5	482.6	0.4144	3194	1.113	13356	1.848	22116	3.298	39576	7.591	91092
35	4.37	3661	81.2	57.7	540.5	10.7	675	621.7	482.8	0.4142	3128	1.121	13452	1.861	22332	3.322	39864	7.645	91740
36	4.29	3627	82.3	56.6	539.7	10.5	668	622.0	483.1	0.4140	3069	1.131	13572	1.878	22536	3.351	40212	7.713	92556
37	4.21	3594	83.4	55.5	538.8	10.3	661	622.2	483.3	0.4138	3010	1.141	13692	1.895	22740	3.381	40572	7.782	93384
38	4.13	3559	84.6	54.3	537.9	10.1	653	622.5	483.6	0.4136	2952	1.149	13788	1.908	22896	3.404	40848	7.836	94032
39	4.05	3524	85.7	53.2	537.0	9.9	645	622.7	483.8	0.4134	2893	1.158	13896	1.923	23076	3.431	41172	7.897	94764
40	3.97	3491	86.8	52.1	536.2	9.7	638	623.0	484.1	0.4131	2834	1.170	14040	1.943	23316	3.467	41604	7.979	95748

REPAIRING REFRIGERATOR MOTORS

(Continued from page 16)

If one field winding is open, that winding will not give a reading on the meter. By probing the windings with the test clips, the break may be located and repaired.

To test the armature for short-circuit, connect field wires *A* and *B* to clip 1 and field wires *C* and *D*, to clip 2, then place the *disassembled armature* into the field. Apply power to the fields and try to revolve the armature. If the armature *can* be revolved, *it is not short-circuited.* If it sticks and *can not* be revolved, look for a solder or a carbon bridge across two adjacent commutator bars. If none can be found, the short must be in the winding and so the armature will have to be rewound. The location of the short-circuit can be found by trying to turn the armature against the opposing force of the field. If this is done for about 60 seconds, the short-circuited winding will become very hot and the place where the short circuit occurs can be readily found.

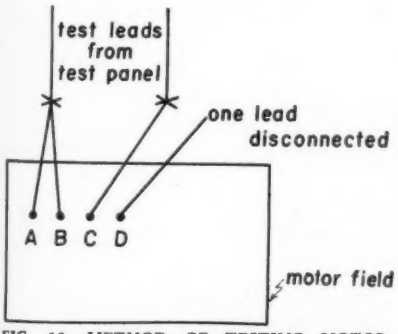

FIG. 10. METHOD OF TESTING MOTOR FIELD FOR SHORT-CIRCUITED TURNS.

Quite often a motor on a refrigerator is over-fused and when trouble starts, the motor runs for long periods of time before the fuse blows. As a result, the armature throws its solder. That is, the solder which holds the wires to the commutator melts and is thrown out of the wire slots by centrifugal force. These wires must be resoldered before the commutator is turned down in the lathe.

To do this, first set the armature in the lathe and take a light cut off the edge of the commutator. Since the commutator is seldom centered on the shaft, the cutting tool will not clean the entire edge. Stop the lathe and clean with a file that part of the commutator which the tool missed. Then start the lathe and sandpaper about an ⅛ inch strip of the commutator face so that the solder will stick to the ⅛ inch strip at the edge of the commutator face. Next, remove the armature from the lathe and place it in a vise. *Clean out each solder slot with a hack saw blade so that solder will flow into every slot.* Now apply a heavy coat of soldering flux to the edge and to the ⅛ inch strip on the face of the commutator. Then solder the commutator by using a hot soldering copper or a small Presto-lite torch. Apply enough heat to completely fill each slot with solder.

Trimming Commutator

When all the slots have been filled with solder, place the armature in the lathe, and take a light cut across the commutator face and another light cut across the edge of the commutator. File off the solder which remains on the edge of the commutator and then sand down both the edge and the face until they are silky smooth.

With a three-cornered scraper (made by grinding the edges of a three-cornered file) scrape out the necklace slot while the armature is revolving in the lathe. *This slot must be scraped smooth and clean or else necklace trouble will develop in a short time.*

Now test the armature for short-circuits as outlined above. If any are found, they will probably be due to a small solder bridge across two commutator segments. Remove any short-circuits before proceeding to assemble the motor. When the armature tests O.K., stand it upright on the bench in its end cover. With a clean cloth wrapped around one of the rods, carefully wipe all the solder flux out of the necklace slot. Then replace the parts in the armature and assemble the armature to the fields.

When assembling the armature to the fields, take care that the slots in the oil flingers are over the pins in the shaft. See Fig. 3. If they aren't, the end bells may crack when the through bolts are tightened up.

S S S

NO WONDER WE ARE TIRED

THE atmospheric pressure at sea level equals 14.7 lbs. per square inch. The body surface of the average male equals 19.5 sq. ft. Thus, the pressure exerted by air on the average male equals about 20 tons.

VERY busy people always find time for everything.

The REFRIGERATION SERVICE ENGINEER

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REFRIGERATION SERVICE ENGINEERS' SOCIETY

FACTS AND SUPPOSITIONS

TOO often in our daily routine of work or home life, irrespective of what our occupation may be, we give too much consideration to suppositions in the solving of our problems, and allow them to confuse the facts.

A fact has been tried and proven, perhaps many times, and thereby becomes a known truth. A supposition is pure fiction, or a product of an imaginative mind. Occasionally a supposition becomes a fact after it has been tried and proven, but on these rare occasions, the supposition has usually been well supported by facts.

This perhaps could be best illustrated by a comparison between a finished product placed on the market, which can be called a fact. The idea of the inventor is a supposition. When the idea is sufficiently supported by facts, it goes to the experimental laboratory, and if it gains merit, may become a fact.

Facts are the materials for thought, and only through thought and discussion in which facts are brought out can problems be properly solved. The suppositions added to the fact are usually only a waste of time, and confuse the fact.

I once worked for a man who refused to receive an oral report. No matter how small the subject, all reports had to be in writing. His reason, as stated by him, was that in oral reports, one leaned too much toward discussion, and in discussion, too many suppositions were introduced, which confused the facts. He was interested in facts only, and by putting the report in writing, you were willing to commit yourself to facts only. Suppositions so often look foolish on paper, and are very often not even worth the effort of writing them. If there were no facts to state, there was no report to make. Needless to say, these reports had a higher average value.

It seems that particularly in the refrigeration service field are we in need of a keen perception between facts and suppositions, because the analysis of troubles is necessarily based on the symptoms indicated, and the known facts about the system. Many servicemen, while analyzing a peculiar case of trouble, have gone to considerable useless work and become entirely confused because their trend of thought was led off the proper track by too many suppositions. While from proven facts he was well acquainted with, he knew that only certain things could produce the indicated symptoms, he allowed imagination and suppositions to lead him to something else.

To get results, one must work on facts.

S S S

AIR CONDITIONING WORTH MORE THAN IT COSTS

AIR conditioning is worth more than it costs by at least 1000 per cent. This was brought out in a recent survey, in which several thousand business men were asked to put a dollar-and-cents value on the comfort and health benefits received from air conditioning in their homes and offices.

The value estimates received were several times higher than industry experts had expected, running over $2500.00 per year in some cases. The average, of course, was lower, but still amounted to more than air conditioning actually costs.

It was found that people place the highest value for air conditioning benefits upon the relief it offers from the discomforts of hot, sticky weather. Some of these discomforts, listed, included: sleepless nights; bodily fatigue; mental sluggishness; loss of time, energy and efficiency; undue perspiration; "wilted" personal appearance; annoyance of insects, dust and drafts; and general irritability.

(Continued on page 60)

REFRIGERATION SERVICE ENGINEERS' SOCIETY

Official Announcements of the activities of the National Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.

THE OBJECTS OF THE SOCIETY

To further the education and elevation of its members in the art and science of refrigeration engineering; for the reading and discussion of appropriate papers and lectures; the preparation and distribution among the membership of useful and practical information concerning the design, construction, operation and servicing of refrigerating machinery.

ASSOCIATION HEADQUARTERS: 433-435 North Waller Ave., CHICAGO, ILL.

FOURTH ANNUAL CONVENTION PROGRESS

RAPID progress is being made in arrangements for the forthcoming annual convention to be held in Chicago, November 3-4-5 at the Stevens Hotel. Though still several months off, preliminary work is rapidly nearing completion, according to Mr. Herman Goldberg, chairman of the convention committee.

To date, 94 per cent of the exhibit space has been reserved by manufacturers, jobbers and distributors, with the possibility in prospect that the allotted exhibit space will have to be increased to accommodate late reservations.

The list of exhibitors, together with their space allotted, which have been added since the June publication of the list follows:

Booth No.

1. Duro Metal Products Co., Chicago, Ill.
3. Commercial Coil & Refrigeration Co., Chicago, Ill.
9. Modern Equipment Corp., Defiance, Ohio.
13. Servel, Inc., Evansville, Ind.
20. Chicago-Wilcox Manufacturing Co., Chicago, Ill.
37. Howe Ice Machine Co., Chicago, Ill.
41. Bonney Forge & Tool Works, Allentown, Pa.
48. Dayton Rubber Co., Dayton, Ohio.
59. Spoehrer-Lange Co., St. Louis, Mo.
61 & 62. Virginia Smelting Co., West Norfolk, Va.
64. G. & G. Refrigeration Co., Chicago, Ill.

Educational program committees are actively engaged in the forming of the most impressive line-up of speakers obtainable.

The Entertainment Committee is guaranteeing that every spare moment from the business sessions will be packed full of real enjoyment and fun.

A feature of this convention, which will establish a precedent for future affairs of its kind, is the forming of a Membership Committee, with the duty of securing new members for all chapters insofar as it is possible through activities at the National Convention.

Plans for the visiting ladies are taking definite shape, with the Chicago ladies, who, of course, will be the hostesses, making every possible effort to arrange for a memorable time for the visitors.

As stated before, the convention will be held at the Stevens Hotel. Having the distinction of being the largest hotel in the world, it also offers the finest accommodations and conveniences to convention gatherings. Situated as it is on famous Michigan Blvd., it offers every means of transportation, almost to its door, and the view across beautiful Grant Park to Lake Michigan cannot be excelled anywhere. Ample space for the parking of cars, either inside or outside as the visitor wishes, is provided within a few steps of the hotel.

For those ladies who are planning a shopping tour during the visit, it is only a few short blocks and within easy walking distance to the large loop stores. Where else can you find all these conveniences in one place?

Remember These Dates
Chicago—November 3-4-5

ABOVE: A VIEW OF THE STEVENS HOTEL, WHICH MAY BE IDENTIFIED BY THE TWO FLAGS FLYING ATOP OF IT. FAMOUS MICHIGAN BLVD. AND A PORTION OF BEAUTIFUL GRANT PARK MAY BE SEEN IN THE FOREGROUND.

BELOW: GRAND BALL ROOM OF THE STEVENS HOTEL, WHERE THE ANNUAL BANQUET OF THE CONVENTION WILL BE HELD.

CENTRAL INDIANA CHAPTER

Meeting of May 18th, 1937

By **PAUL JACOBSEN,** *Secretary*
R. R. 2, Marion, Indiana

THE facilities of the Indiana General Service Building in Marion, Indiana, had been offered to the chapter so we might have a buffet supper on our meeting night of May 18th.

The meeting was opened by President Vern Nold and the regular business session of the Chapter was dispensed with due to the many guests present at the meeting.

A buffet supper of roast beef with all the trimmings was served by the Ladies Committee, consisting of Mesdames E. Jacobsen, R. H. Morris and V. Nold. The supper was enjoyed by all and immediately afterward the educational program of the evening was started.

Mr. McKesson of the Ansul Chemical Company was the speaker. He showed slides of some of the latest experiments in the company's laboratories, and gave a very interesting account of why various things happen. Questions were presented and answered by Mr. McKesson and he promised further information as soon as he arrived back at the plant.

A number of dealers and their representatives from Marion were present, and all enjoyed the evening.

Presentation of the charter was made by National President Paul Jacobsen, who administered the oath to the membership and welcomed the members into the National organization.

* * *

ST. LOUIS CHAPTER

Meeting of July 8, 1937

By **E. A. PLESSKOTT,** *Secretary*
2145 67th St., St. Louis, Mo.

THE regular meeting of the St. Louis Chapter was held at the German House, Thursday, July 8th. Mr. Gygax apologized for failure to call the two previous meetings and attributed this to the fact that the Chapter Secretary was away on a much-earned vacation.

In the absence of our speaker of the evening, Mr. A. B. Schellenberg, of the Alco Valve Co., up to this time, Mr. Gygax gave a detailed outline of the doings at French Lick last month.

Mr. O. H. Tinkey, our educational director,

noting the nice turn-out at this meeting, which was to be an open forum on expansion valves, decided to talk on this subject. With the aid of a blackboard, he outlined the construction, basic principles, method of applications, and service difficulties encountered in the field. He was assisted in this presentation by Mr. F. E. Ince of the Spangler Company, Inc. Some timely suggestions on display case installations and trouble shooting were given by Mr. P. Bensinger.

Motion was made and seconded that our next meeting, at which General Motors was to exhibit some of their recent engineering films, should be held at Garavelli's private dining room, the Secretary to make all arrangements.

Mr. Gygax outlined some of the work being done by the A.S.R.E. on new code covering refrigeration service and installations. Mr. Gygax is a member of this committee. He requested members make known their wishes in this regard, as it will be extremely difficult to make changes, once the code is adopted. At the present time, the schedule calls for completion of this code for submission to the Aldermanic body by September 1st. Further details will be brought out at future meetings.

Mr. Gygax expressed the opinion that this code and some of its provisions should be instrumental in increasing our membership as we intend to be in a position to coach service men, helping them make a satisfactory grade. When the time comes, meetings will be set aside for this purpose and members in good standing only will be permitted to attend.

Meeting of July 22nd

The regular meeting of July 22nd was held in the private dining room of Joe Garavelli's restaurant at 5701 DeGiverville.

After a very satisfactory meal, the entertainment feature of this program—some very interesting films were shown through the courtesy of the General Motors Corporation. At the conclusion of the showing, Mr. Gygax spoke briefly on the revised refrigeration code, which shows promise of being more acceptable than the original.

New Members Received

Several new applications were received and referred to the Membership Committee.

Mr. E. C. Fix and Mr. L. L. Vollman received the personal thanks from the Secretary for being instrumental in bringing two new members into the fold.

CHICAGO CHAPTER

Meeting of July 27, 1937

By WILLIS STAFFORD, Secretary
726 Hinman St., Aurora, Ill.

THE only committee having a report to make was the Licensing Committee. The committee's chairman, Mr. I. Skipple, reported that the bill which was passed at the State Legislature providing a licensing law for refrigeration service men was vetoed by Governor Horner.

Under the head of new business, President Skipple told of the proposal to hold a joint picnic with the Chicago Master Refrigeration Association. It also was announced that the Board of Directors approves this proposal.

A motion by Harry Logemann, seconded by Nick Clement was carried, that we hold the picnic on August 15 in cooperation with the above Association. The Chair then appointed Mr. Skipple and Mr. Fred Roth to a Picnic Committee to make the necessary arrangements.

A lengthy discussion was held on the educational program for the next three months. A motion by Mr. H. Bernhart, seconded by Mr. Logemann, was duly carried that we set up a definite educational program for the next three months and have this printed in poster form so that they can be placed in the various jobbing houses to advertise the attraction of attending R. S. E. S. meetings.

President Skipple then called on Mr. Harry D. Busby, who has recently been appointed as associate editor of THE REFRIGERATION SERVICE ENGINEER. Mr. Busby told what material he was planning to present in future issues of the magazine.

A discussion on heating to tie-in with air conditioning will be given in detail. Editor Busby stated that he would be happy to receive suggestions from the members as to their desires of reading matter in the magazine.

Limit Talks to Half Hour

Mr. Harry Drownes suggested that we have more peppy educational programs, that these programs be limited to not more than one-half hour and that we use manufacturers' representatives who have working models of their products for us to inspect thoroughly.

Due to the absence of Mr. R. L. Hendrickson, chairman of the Educational Committee, no definite action was taken on the educational program.

VIEWS AND REVIEWS

by HERMAN GOLDBERG

I HAVE been noticing a feature of human relationship or behavior in our current changing business conditions, especially pertaining to a number of our small tradesmen. This is caused in part by lack of understanding of the rules of the game but in many instances by deliberate side-stepping or evasion of the rules necessary for good trade conduct.

As an alumnus of grammar schools (not reform) in the "Valley" district of Chicago, I can remember that when the kids played marbles they played "for keeps" and when the other kids out-played or out-guessed them, they didn't dare cry or lay further claims to the mibs they had lost fairly. This was mainly because they understood their game and its chances of loss and then there was that punishment to all cry-babies (welchers) in the way of a good old-fashioned sock in the nose and a kick in the pants.

Those kids weren't tough; they were just hard-boiled in their honesty.

During the past few years we have had a moral let-down in business ethics and tactics. However, we are now getting back to the position where the fellows indulging in unfair practices and unjust claims in purchasing and returning materials are going to be looked down upon and held in restraint by people (in their own game or business sphere) who know that certain rules or laws must be adhered to for the better general welfare of the majority.

Some Still in Difficulty

Many an honest man is still in financial difficulties because of the recent (or present?) bad times. As a rule somebody seems always willing to gamble somewhat and play with men of this type. However, the out-and-out dead-beats who have absolutely no thought of following the rules may find to their surprise that reputable companies will have nothing to do with them as times become increasingly better.

Talk to Your Friends About the Coming Convention!

S S S

Ora C. Schafer
Illinois

I find the SERVICE ENGINEER contains lots of information that would be hard to obtain elsewhere.

TRI-COUNTY CHAPTER RECEIVES ITS CHARTER

TRI-COUNTY CHAPTER No. 1, comprised of service men in Du Page, Kane and Will counties (Illinois), received its charter at a meeting in Aurora, on July 21st.

This new chapter had its first meeting in the early part of June at which time temporary officers were elected as follows: Mr. B. V. Clark, *temporary chairman,* and William C. Metcalf, *temporary secretary-treasurer.*

At the second meeting, held the last week in June, the charter was closed with fifteen members to be enrolled with the National Office. This meeting also had a very interesting educational program, consisting of a talk by Mr. R. L. Hendrickson of the Utilities Engineering Institute of Chicago. Mr. Hendrickson gave a very instructive talk on evaporative condensers.

At the meeting of July 21st it was decided not to elect new officers until a better representation could be obtained. Mr. Willis Stafford, secretary of Chicago chapter, acting as a special representative of the National Society, presented the charter to the chapter and administered the oath to the following charter members:

Harold Anderson	Wm. C. Metcalf
Harvey Burgess	Kenneth Pentz
B. V. Clark	J. P. Priegel
A. G. Davis	James Quarnstrom
W. S. Davis	M. P. Reichenbacher
Clark Feeney	A. E. Wolff
Russell Hagemann	Cecil York
L. P. Kodrich, Jr.	

After the presentation, further business of the chapter was carried on. It was decided to hold the next meeting in Joliet and to obtain an interesting educational speaker.

After the meeting adjourned, refreshments were enjoyed by the members.

X X X

H. J. Schroeder Co.
Indiana

The service companies in our territory like your magazine very much and find it carries very valuable information.

YOU will benefit only in proportion to what you contribute.

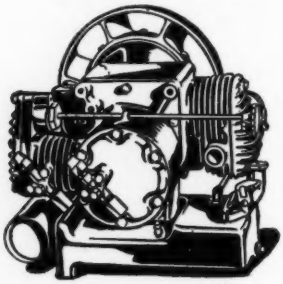
Take an active interest in your Chapter.

NEW MECHANICAL DEVICES
Service Tools and Special Equipment

Under this heading there will be published illustrated descriptions of new or improved service tools and equipment for the Service Engineer. Information contained in this department is furnished by the manufacturer of the article described and is not to be construed as the opinion of the Editor.

NEW GASOLINE DRIVEN UNIT

A SELF-POWERED refrigerating machine of the gasoline engine driven type in one compact unit is the latest thing in refrigeration equipment designed for use in homes, farms or stores where electricity is not available.



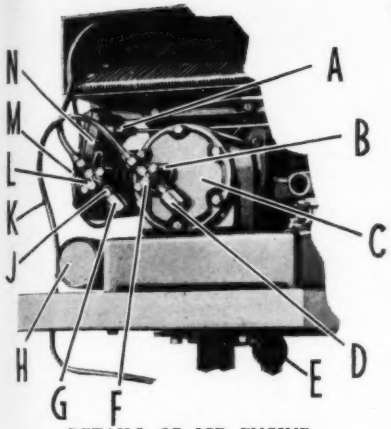
NETCO ICE ENGINE

To Be Handled by National Electric Tool Co.

Designed and built by the Waukesha Motor Co., the unit will be sold only under the name of Netco.

The National Electric Tool Co., 560 W. Washington Blvd., Chicago, Ill., has issued a descriptive folder on this unit, which gives complete specifications and details of its construction.

The unit is powered by a ¾-hp. gasoline motor of the single cylinder, air-cooled, four cycle type. The compressor is driven at one-half the speed of the motor, or 625 r.p.m.



DETAILS OF ICE ENGINE

A—Diaphragm type packless relief valve, unloads compressor. B—Refrigerant cut-off valve, "low side." C—Compressor crankcase cover. D—Seal cap for refrigerant cut-off valve. E—Refrigerant automatic expansion valve. F—Pipe plug for gauge connection to read "low side" pressure. G—Seal cap for refrigerant cut-off valve, "high side." H—Refrigerant receiver. J—Refrigerant cut-off valve, "high side." K—Refrigerant return line, "low side." L—Pipe plug for gauge connection to read "high side" pressure. M—Compressor cylinder head. N—Compressor valve plate.

It is a reciprocating single cylinder type, with a displacement of 5.96 cubic inches.

All parts are automatically oiled and require practically no attention. The unit is shipped charged with 2 lbs. of methyl chloride.

x x x

IMPERIALS BEAT ALTERS 13-7

THE interest and excitement created by various Chicago companies who enter their teams in local soft ball leagues is growing very intense. The craze is spreading rapidly, and the companies are giving their teams every support possible to further the interest.

Recently, the Harry Alter Co. challenged the Imperial Brass Mfg. Co., and the game was played July 23. Several hundred "rooting," "hooting" baseball fans and supporters of the teams witnessed a very closely contested game up until the eighth inning, in which the Harry Alter team seemed to slip, allowing the Imperials to win 13 to 7.

One casualty was reported during the game. Mr. Irving Alter lost his voice after a few strenuous innings of rooting and was forced to content himself from then on with

THE SOFT BALL TEAMS OF THE HARRY ALTER AND IMPERIAL BRASS COMPANIES. In addition to the teams are: 1st row center—W. L. Leonard, Jr. and Mr. Shafer of Imperial Brass; 1st row right—Mr. Benson of Imperial Brass; 2nd row left—Mr. Don Samuels and Miss Adele Becker of Harry Alter Co.; 2nd row right—Mr. Irving Alter.

merely jumping up and down and waving his arms.

A generous representation of both companies was present, as may be seen in the picture of the two teams. Mr. McNellis, of Imperial Brass, who was present, arrived too late for the picture.

HELLO, HONEY

JUST in case you were one of the many this summer who were greeted by a "Hello, Honey" sign on the windshield of a passing automobile, especially in the Middle West, you will be interested in the explanation that this was a novel promotion

contest sponsored by the Minneapolis-Honeywell Regulator Co., of Minneapolis, Minn.

Employees of Minneapolis - Honeywell were awarded prizes, based on the longest distance away any two of them met while vacationing from Minneapolis. The employees were able to distinguish a fellow-workman by the "Hello, Honey" sign on the windshield of his car.

Two Meeting 2193 Miles Away Take First Prize

Medora Miller and Jean Whited grabbed off first prize money by meeting each other in Los Angeles, California, after 2,193 miles of travel. Other prize winners found Minneapolis-Honeywell employees "running" across each other in Portland, Oregon, 1,958 miles from home, and in Salt Lake City, Utah, 1,418 miles away.

This novel promotion scheme not only livened up the employees' vacation trips, but proved to be a valuable publicity source for the company, because if you looked closer, you would have noticed that the entire windshield poster read, "Hello Honeywell"—the "well" in smaller letters.

HARRY ALTER ELECTED PRESIDENT OF GENERAL HOUSEHOLD UTILITIES CO.

HARRY ALTER, well known distributor of refrigerators, radios, appliances and refrigerator parts, was elected president of the General Household Utilities Co., manufacturers of Grunow Radios and Refrigerators at a recent meeting of the board of directors. Other officers elected were A. Dangler, Jr., vice-president and treasurer, and T. E. Pegram, secretary. Mr. William Grunow was made Chairman of the Board.

Harry Alter is a well-known figure in the appliance field, having been one of the first distributors to enter the radio field in its inception. The Harry Alter Co., as distributors of refrigeration parts and appliances, will be managed under the supervision of his brothers, Arthur and Irving.

The refrigeration and air conditioning parts division with its six branch stores in Chicago, New York, Cleveland, and St. Louis will be under the direct management of Irving C. Alter. Arthur Alter has charge of the distributing division, handling Grunow Radios and Refrigerators, Chambers

Gas Ranges and Marion Electric Ranges. Harry Alter's Dependabook listing a wide variety of refrigeration parts, equipment and supplies has become a byword to the serviceman and dealer. The increasing demand has made it necessary to enlarge the personnel as well as add additional space for storage and shipping purposes. The export department is managed by Mr. Al Port, while domestic sales are carried on under the forceful direction of Mr. Charles Cappels.

\$ \$ \$

JOBBERS AND MANUFACTURERS APPOINT NEW SECRETARIES

FRANK J. GLEASON, who for the past two years held the position of Executive Secretary for both the National Refrigeration Supply Jobbers' Association and the Refrigeration Supplies and Parts Manufacturer's Association, resigned July 1. Mr. Gleason has joined the organization of the Brunner Mfg. Co., Utica, N. Y.

A meeting of the Parts Manufacturers was held on June 30, in Chicago, after which President J. D. Collyer announced that R. M. McClure, of Ortman, McClure, Hadden & Co., association management engineers with offices at 111 W. Washington St., had been appointed Executive Secretary.

On July 6, President R. H. Spangler, of the Supply Jobbers' Association announced that F. Ralph Bush, of Ortman, McClure, Hadden & Co., was appointed Executive Secretary.

Mr. Gleason Formerly in Manufacturing Field

Mr. Gleason, prior to his association work, was connected with Universal Cooler Corp. for a number of years. He is returning now to executive work in the manufacturing field. During his two years of association work, Mr. Gleason was a strong factor in building the two associations to their present high standing.

\$ \$ \$

BOOMERANG

THE youngster who had so often heard his father's favorite remark—"That guy is nuts"—finally asked his dad one morning:

Son—"Daddy, do you have to be nuts to be a service man?"

Father—"Well, no, son, not exactly, but it helps."

HOW FAST IS TOO FAST?

STUDIES of vehicular speeds in relation to accidents are essential in understanding and solving the traffic accident problem. Such studies should result in a better realization by drivers as to when speed becomes "too fast for conditions." They should enable traffic engineers to locate the necessary highway safeguards for the guidance of drivers. They should make more certain and effective the work of the enforcement officer. In general, such studies should promote the maintenance of street and highway facilities which will enable travelers to reach their destinations quickly; and simultaneously, speeds for the facilities which are so designed.

Present day reports of actual speeds in motor vehicle accidents are not believed to be reliable. There is sufficient data, however, to determine that in any group of accident, the chances of a fatal result increase rapidly as the speed mounts. Whereas in all motor vehicle accidents it is estimated that

(Continued on Page 53)

HOW FAST IS TOO FAST

(Continued from Page 51)

there are 35 injuries for every fatality, in accidents occurring at speeds of less than 20 miles per hour, this ratio increases to 61 non-fatal accidents for every fatal accident and at speeds in excess of 50 miles per hour, the ratio falls until one accident in every eleven proves fatal.

The Higher the Speed, the Worse the Accident

Miles per hour	One accident is fatal in
0-20	61
20-29	42
30-39	35
40-49	25
50 and over	11

The solution of traffic problems will be helped along by better determinations of the speeds of vehicles in accidents. But safety can come, too, from an understanding of what speed means in the ordinary, safe operation of a vehicle. If, for example, every driver understood exactly what distance is necessary for stopping his car at any particular speed, there would be far fewer accidents. Not many drivers realize that, event at the low speed of 20 miles per hour, a car with brakes in average condition cannot be brought to a stop in less than 52 feet, including the reaction time involved before the driver starts to apply his brakes. This average stopping distance moves rapidly upward—to 100 feet at 30 miles per hour, to 164 feet at 40 miles per hour, to 243 feet at 50 miles per hour, and to 330 feet at 60 miles per hour. These distances will, of course, be somewhat greater on wet pavements, if tires do not grip well, or if brakes are in "less-than-average" condition; and conversely, will be less if brakes are in "better-than-average" condition.

A 1936 California speed study shows that all observed vehicles on rural, level, open roads, where high speeds would be expected, averaged 44 miles per hour. Twenty-two per cent of the drivers involved were traveling at speeds in excess of 50, while 6 per cent were traveling at speeds less than 30 miles per hour. Especially on high-speed, rural roads, the small percentage of drivers who travel at excessively low rates of speed can become a special hazard just as the

other small minority traveling at too high a rate.

A Connecticut speed study completed in 1934 showed an average rural, open road speed of 40 miles per hour, with only 13 per cent of the cars traveling at speeds in excess of 50, and 9 per cent traveling under 30 miles per hour. In the Connecticut study, the remaining drivers were distributed equally in the 30-40 and 40-50 miles per hour classes (39 per cent in each group) whereas in California 46 per cent were traveling between 40 and 50 miles per hour and only 26 per cent between 30 and 40 miles per hour.

JACKSON CITY ORDINANCE

THE City Council of Jackson, Michigan, recently gave first reading to an ordinance, requiring a permit for the installation and repair of refrigerating equipment, among other things. Following is the final form as adopted May 18, 1937:

ORDINANCE No. 165

An ordinance to provide for the issuance of building permits and to establish a schedule of fees for same and to repeal Ordinance No. 156.

Section 1. No person, firm or corporation shall erect, enlarge, alter, convert, repair, move or demolish any building or structure nor shall any person, firm or corporation install any of the equipment listed in Section 2 without first obtaining a building permit therefor and paying to the City Treasurer a fee in accordance with the following schedule.

Section 2—

For a total valuation of $100.00 or less	$ .50
For a total valuation of $100.00 to and including $500.00	1.00
For a total valuation from $501.00 to and including $1,000.00	2.00
For each additional $1,000.00 or fraction thereof of total valuation to and including $15,000.00	2.00
For each additional $1,000.00 or fraction thereof of total valuation exceeding $15,000.00	1.00

Wrecking Permits	1.00
Moving Permits	2.00
Tents	2.00
Gravity Type Warm Air Furnace	1.00
Steam or Hot Water Systems	
Forced Circulation Warm Air Systems	
Air Conditioning Systems	
For a total valuation up to and including $1,000.00	2.00
For each additional $1,000.00 or fraction thereof of total valuation	2.00
Stokers (Separate Installation)	2.00
Oil Burners (Separate Installation)	2.00
Automatic Sprinkler Systems	
Elevator Installations	
Refrigeration Systems (except self-contained units)	
For a total valuation up to and including $1,000.00	2.00
For each additional $1,000.00 or fraction thereof of total valuation	2.00
Concrete Building Units — Manufacture or Sale of—Yearly Permit	10.00

Section 3. The fee shall be based upon the estimated cost by the applicant which cost shall be checked by the Building Inspector by multiplying the square foot area of the building by a unit value per square foot as established by the Building Inspector.

Such unit values shall be computed from time to time by the Building Inspector and submitted to the Engineering Department and City Assessor for approval. When approved, such values shall be dated and posted in a conspicuous place in the office of the Building Inspector. No permit may be issued upon a lesser value than determined from this table, but the unit value in such tables shall be re-determined as may be necessary by changes in construction costs.

Section 4. Any person who shall on his own account or as agent for another, violate the conditions of any permit or any of the provisions of this Ordinance shall upon conviction thereof be punished by a fine not exceeding One Hundred Dollars ($100.00) or by imprisonment not exceeding Sixty (60) days or both such fine and imprisonment in the discretion of the Court.

Section 5. Ordinance No. 156 entitled "An Ordinance to Establish Permit Fees for

the Issuance of Permits under the Building Code and Electrical Code," adopted May 28th, 1935, is hereby repealed.

Section 6. This Ordinance is hereby declared to be an emergency ordinance and given immediate effect.

\$ \$ \$

KEEP well informed. Identify yourself with the official society of your business. *The Refrigeration Service Engineers' Society.*

HEATING AND AIR CONDITIONING

ONCE more for another year, the refrigeration service business is on the decline, and again in another two or three months, the old problem of what to do in the winter-time will be a subject of concern.

It has been suggested before, and is again being suggested here, that the oil burner and stoker service business is a logical combination with refrigeration service because of the opposite seasons of its peak-work. Apparently, very little or nothing has been done about the combination as yet. It is difficult to say why this is so, but perhaps it is because there are few men who have a working knowledge of both, and there has been no one to give the combination a start.

It is believed that due to the trend in air conditioning equipment for smaller buildings, which combine heating and cooling devices into one central plant, that the serviceman is going to be called upon in the near future to service the unit in both its functions, and will have to prepare himself with a knowledge of heating, or permit another group, who will spring up for the purpose, to take a good portion of the air conditioning business away from him.

New homes, being constructed at this time, are making provision for combined heating and air conditioning in a central plant, and these plants are being built in many designs and styles for either gas, oil or coal. All are being designed for automatic control, and undoubtedly will require service from time to time.

With these thoughts in mind, it is apparent that the time is ripe for a series of articles on the subject of heating. Starting with next issue, and continuing in succeeding issues, will appear a complete short

course in heating and air conditioning. The course will be in approximately 12 chapters, leading eventually to specific information and data on automatic coal and oil burning equipment and controls.

The course is designed primarily to give the serviceman a complete working picture of the field in as short a time as possible, and with the least amount of tedious technical information as possible.

Your Comments Are Invited

It is sincerely hoped that the information will be found as useful as it is intended to be. Helpful criticism will be welcomed from time to time, which will help in the designing of these articles.

S S S

TIME spent in the discussion of a problem is cheaper than dollars spent in its correction.

Attend your Chapter meetings.

S S S

IMPERIAL INTRODUCES COMBINATION TUBE BENDER AND COIL MAKER

A NEW, handy combination tube bender and coil maker, especially adapted to refrigeration and air conditioning work, has been announced by The Imperial Brass Manufacturing Co., Chicago, Ill. This tube bender not only can be used to bend tubing to any desired angle and to make return bends, but also to make either round or obround coils.

IMPERIAL TUBE BENDER

It will take copper, brass or aluminum tubing in thicknesses between .020 inch and .065 inch. Separate benders are available for ⅜ inch, ½ inch, ⅝ inch and ¾ inch O.D. tubing. The tool is designed to clamp on a bench, as illustrated, and the bending form is calibrated to show 45 degrees, 90 degrees, 135 degrees and 180 degrees positions. Its operation is exceedingly simple, and neat, accurate bends are made without flattening or crimping the tubing. The bender is designated as Imperial No. 460-F.

AGREEMENT REACHED BETWEEN COMMERCIAL COIL AND LARKIN

THE patent litigation between Commercial Coil and Refrigeration Company and Larkin Refrigerating Corporation over the "Coltrol" brine-circulating type beer cooler has been settled by means of a consent decree entered in the state and federal courts, under the terms of which Larkin will no longer manufacture a beer cooler of the "Coltrol" type.

Terms of the Decree

Under the terms of the decree, an agree-

ment reached in a previous suit whereby Commercial Coil Company granted Larkin a limited license to manufacture and sell a water cooler having a capacity of not less than 75 gallons and a 15 degree F. temperature drop, and having a circulating pump of not less than 1/6 hp., was ratified and will be effective.

The "Coltrol" beer cooler was designed by Matthew P. Fugle, Chicago refrigeration engineer, who assigned his first patent on the cooler to Commercial Coil Company, but while still working for Commercial Coil, assigned a half-interest in his second patent

"CONTROL" TYPE BEER COOLER

on the device to Larkin Refrigerating Corporation.

Commercial Coil brought suit to compel an assignment of the second patent and later brought suit for infringement of the first patent. By the terms of the consent decree Larkin and Fugle assign their interests in the second patent to Commercial Coil and Refrigeration Company.

ANSUL'S AD-VERSES

A HUMOROUS little booklet, containing reprints of the doings of the Ansul Twins, Sulphur Dioxide and Methyl Chloride, together with poetical inscriptions, has just been released by the Ansul Chemical Co., of Marinette, Wis.

The antics of the twins, in action high and wide, covering the story of Ansul from almost every side—darn it! They got us doing it, too. After reading all that poetry, we can't get out of the swing.

However, the last page in the book suggests that it be taken home for the children to color in crayon and thereby get an early knowledge of Ansul refrigerants. The paper used in the printing readily accepts crayon.

BEN BOALT JOINS PERFEX

THE Perfex Corporation, manufacturers of automatic controls, announces that Mr. Ben L. Boalt has joined the organization in the capacity of a vice president.

Mr. Boalt has made many friends during his long contact with the heating and refrigeration industries. This long association dates back to 1921 when Mr. Boalt was the secretary and a director of the old Minneapolis Heat Regulator Company. He continued in these capacities when Minneapolis-Honeywell Regulator Company was formed. When the Time-O-Stat Controls Company was acquired, he was transferred to the Elkhart, Ind., plant, of which he was manager.

From 1931 until the present, Mr. Boalt was a director and vice president of Penn Electric Switch Company.

Mr. Luthe, president of Perfex, made the following statement: "We feel fortunate in having Mr. Boalt join us because his intimate and thorough knowledge of the heating, refrigeration and controls industries places us in a position to better serve our customers."

Mr. Boalt's office will be at the company's home office, 415 West Oklahoma Place, Milwaukee, Wisconsin.

BEN BOALT

AIR CONDITIONING WORTH MORE THAN IT COSTS

(Continued from page 38)

Hay fever and pollen asthma sufferers added health values to the list. Air conditioning gives relief in these conditions by temperature control and air filtration, and offers comfort otherwise unobtainable except at mountain or seashore resorts. Some sufferers put the value of this relief at as much as $500.00—the average was $235.00. This sum is much less than the cost of spending six weeks at a hay fever resort if transportation and loss of working time is counted in.

Improved resistance to disease, a shorter convalescence period after an illness or operation, and relief from nervous disorders accentuated by extremely hot weather, were valued at $100.00 to $800.00 a year. General excellence of body tone was another value which the air conditioning enthusiasts declared to be of dollar-and-cents value.

W-M REFRIGERATION CO. INCREASES SPACE RENEWS LEASE

A NEW three-year lease on its present location has recently been signed by the W-M Refrigeration Co., of Milwaukee, Wis. They have also added an extra floor of the building to their space.

Mr. G. D. Wang is President, and Mr. F. A. McLaughlin is Secretary-Treasurer of this progressive organization.

The company has been agents for Copeland commercial equipment for the past 12 years, and more recently has taken on the household line.

FEDDERS FACTORY BRANCH OPENS IN DETROIT

THE opening of a new Fedders Factory Branch at 1036 Beaubien Street, in Detroit, Mich., further extends the Fedders policy of service to the refrigeration, air conditioning and heating trade. This new Detroit Branch in charge of Leo J. Freitas, former Branch Manager at Dallas, Tex., provides factory engineering service and a large warehouse stock of Fedders appliances in the heart of the Detroit territory.

Branch Manager Freitas has had specialized training and experience in the Fedders

Development Engineering and Research Department as well as extensive field work on refrigeration and air conditioning.

Horace I. Schmidt New Manager of Dallas Branch

Fedders Dallas Branch will be managed by Horace I. Schmidt who is a "graduate" of Fedders Development Engineering and Research Department and has been located at the Dallas branch for several months.

XYLENE

(Continued from Page 34)

sludge deposits and oil from sulphur dioxide systems when overhauling. Offhand, it would appear that Xylene would be of no help in drying, as water does not dissolve in it. Its use should be followed with the usual drying procedures. We are not able to venture an opinion as to the effects of operating a sulphur dioxide system with appreciable quantities of Xylene present."

Mr. Geo. H. Clark, in answer to Questions No. 202 and 208, has the following to say:

"Xylene is an excellent solvent for the binder of carbon sludge, which forms in sulphur dioxide systems as a result of moisture and the breaking down of the oil. It should do a fairly good job of cleaning, although I am doubtful of its ability to clean pistons and cylinders of a compressor which have been stuck up. It has the advantage over other cleaners in that it can be used in the system in small quantities during operation so that it will prevent sticking-up even though it may not entirely clean the result of the stick-up. The Xylene acts as a solvent for the binder, which holds the carbon together in chunks and seems to break it up into very fine particles so that the carbon circulates as an emulsion in the Xylene. This does prevent the sticking-up of compressors to a great extent. However, I would say that a suitable drier should also be used in order to neutralize the acid which forms as a result of the sulphur and CO_2. Such a drier or corrosion retarder may make use of zinc granules or activated alumina or calcium oxide as a neutralizing agent, and such corrosion arrestors should be used in the liquid line. We may also remove some moisture from the system if we use an anhydrous calcium chloride drier in the suction line. I would not use more than one tablespoonful of Xylene in a household system."

Index to Advertisements

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